The Journal of Obstetrics and Gynaecology of the British Empire

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1 Human Fertility 5:97, 1940. ibid. 6:1, 1941; ibid. 9:32, 1943.

2 Am. J. Obst. & Gynec. 41:850, 1951.

3 Virginia M. Monthly 70:238,1943.

4 Western J. Surg. Obst. & Gynec. 57:708, 1950.

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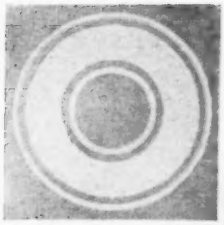

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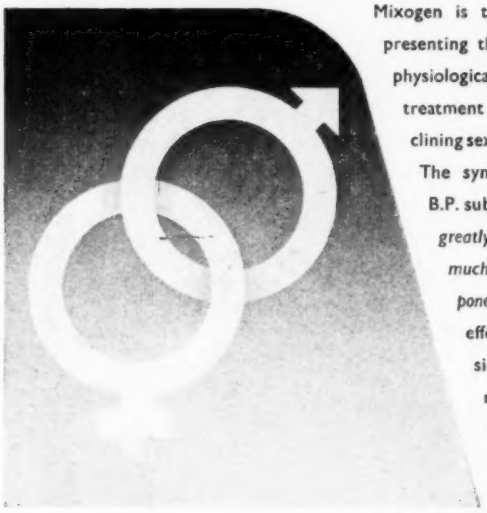

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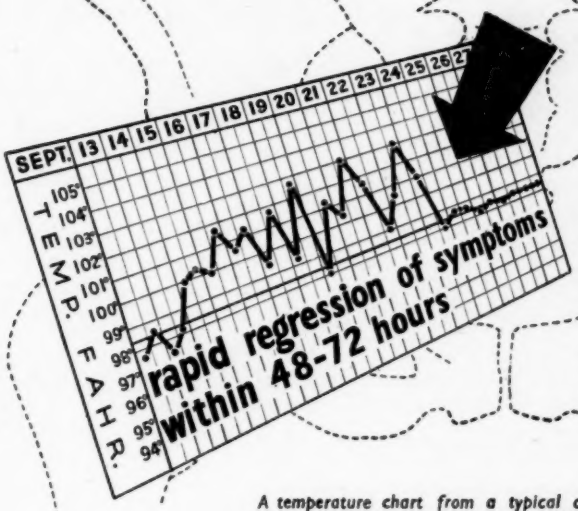

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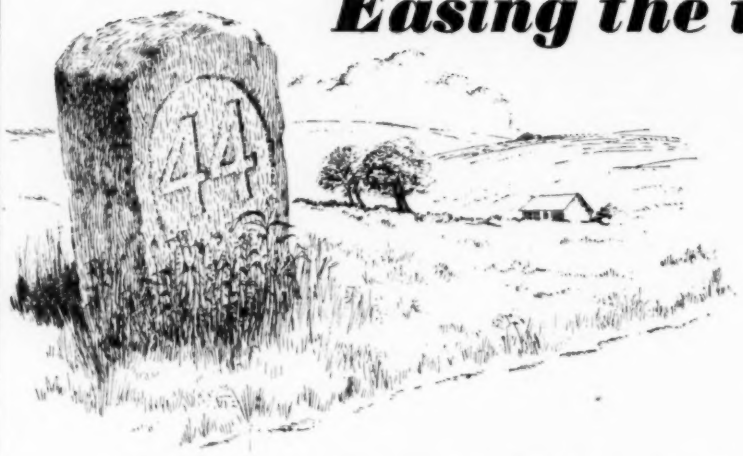

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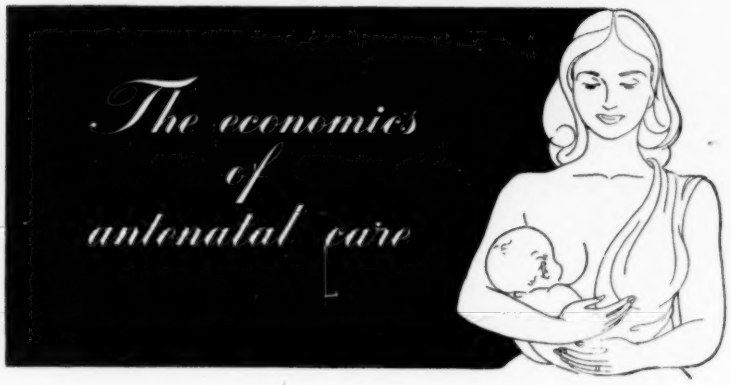

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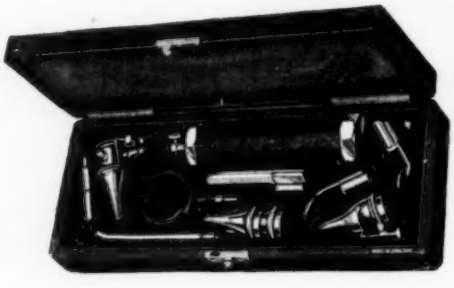

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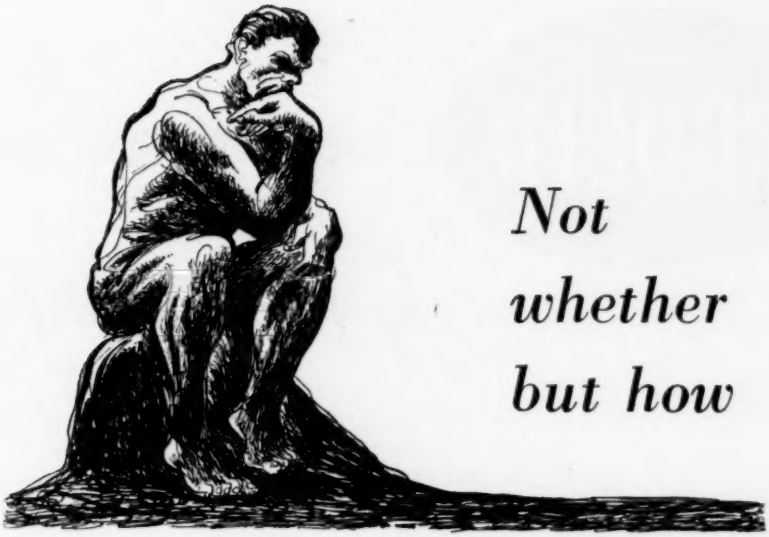

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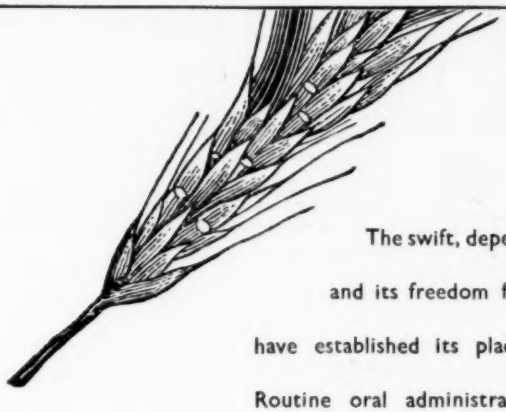

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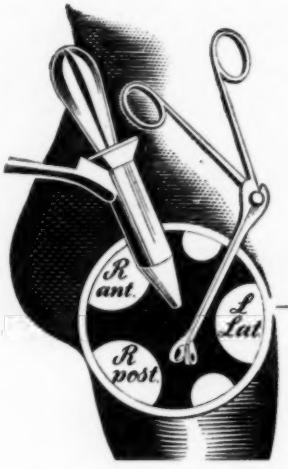

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THE
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of the British Empire

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THE PRINCESS CHARLOTTE OF WALES: A TRIPLE OBSTETRIC TRAGEDY*

BY

SIR EARDLEY HOLLAND

THE news of Princess Charlotte's death in childbirth on 6th November, 1817, after she had given birth to a stillborn Prince, struck Britain like a thunderbolt. The state of grief and consternation was indescribable. For many days the nation presented the picture of one united family in deep mourning.

"Her death produced throughout the kingdom the feelings of the deepest sorrow and most bitter disappointment. It is scarcely possible to exaggerate, and it is difficult for persons not living at the time to believe, how universal and how genuine those feelings were. It really was as if every household throughout Great Britain had lost a favourite child."—(Brougham).

Lord Holland records that on his return to England, three days after her death, everyone he met on the road between Dover and London, including postboys and turnpikemen, bore signs of mourning on their persons. Byron from Venice, where he was writing the fourth Canto of *Childe Harold* (into which he inserted six verses on the tragedy), wrote: "The death of the Princess Charlotte has been a shock even here and must have been an earthquake at home."

One has only to see the number of memorial books and pamphlets, the torrent of poems, the sermons from almost every pulpit, the commemorative pictures and engravings, the medals and china, the variety of other memorial objects that were made to suit the pockets of both rich and poor, and to read the newspapers of those days, and the many diaries and memoirs of the Regency period, to appreciate the feelings of the people.

The sustained and, one might say, inordinate grief began to strike fear into the expectant mothers and fathers of the nation, as was expressed in a letter to *The Times* of 18th November, in which the writer asked if the most direful results might not be expected if the minds of interesting females were allowed continually to dwell on so distressing a subject. "The daily papers," he went on, "the shops, the public handbills, in fact everything on which we can cast our eyes, brings the great loss the nation has suffered continually to mind."

I have said that the grief was inordinate, and the impression is indeed given that the public reaction was greater even than that which would be expected normally to result

* The William Meredith Fletcher Shaw Memorial Lecture delivered at the Royal College of Obstetricians and Gynaecologists, 28th September, 1951.

from the death in such circumstances of the heiress to the Throne and an infant prince.

There were indeed associated circumstances that heightened the tragedy, and I must remind you of the history of Charlotte and her background before I come to the medical side.

She was only 21 when she died. Captain Gronow describes her when she was 18, at a fête at Carlton House, her first public appearance: "She was a young lady of more than ordinary personal attractions; her features were regular and her complexion fair, with the rich bloom of youthful beauty; her eyes were blue and very expressive, and her hair was abundant, and of that peculiar light brown which merges into the golden. . . . In figure her R.H. was somewhat over the ordinary height of women, but finely proportioned and well developed. She created universal admiration, and I may say a feeling of national pride amongst all who attended the ball." Such was the impression of a young guardsman.

Fanny Burney records her a year later, at a Drawing Room at the Queen's Palace: "The Princess Charlotte looked quite beautiful. It was impossible not to be struck with her personal attractions, her youth and splendour."

Evidently, she had radiant vitality, but no one can begin to understand her behaviour, her moods, and her few minor maladies, without realizing that her whole life was spent in a state of emotional stress that originated in the bitter and intractable quarrel between her father and mother.

Her father, the Prince of Wales, had made a disastrous marriage with Princess Caroline of Brunswick. She was chosen by the King, and the Prince never set eyes on her until just before the marriage ceremony. His debts amounted to £500,000, and it was to get this huge sum paid off by Parliament that he consented to a royal marriage. He was already married, secretly, to Mrs. Fitzherbert, a virtuous widow of good Roman Catholic family, with whom he was deeply in love. But this union was easily annulled because the Prince had broken the Royal Marriage Act under which, until he was 25 years old, he could not marry without the King's leave. Moreover, under the Act of Settlement he had forfeited his rights to the Crown by marrying a Roman Catholic.

To a Prince who had been surrounded by the most cultured and wealthy aristocracy in the world, and had enjoyed for many years the favours of women remarkable for beauty and elegance, this poor young Princess, brought up in a minor German court, where both manners and morals were coarse, could not fail to be unattractive and even repulsive. She was quite pretty but was hoydenish, ill mannered, voluble, badly dressed. Directly the Prince saw her he demanded brandy, and it is said he never shared her bed after the first night. Three months after Charlotte's birth they parted company for ever.

Charlotte had, in consequence, from infancy been more or less kept apart from her mother, whom she loved. For her father it is unlikely that she felt much affection or respect; he seems to have taken only a spasmodic interest in her, was jealous of the nation's affection, and though not without a father's fondness, was sometimes unkind. As a result she was lonely and secluded, dependent on governesses and tutors, with no real family life, and deprived of parental love. Being a high-spirited, impulsive, warm-hearted girl, she demanded affection but never got it until that year and a half of indescribably happy marriage with Prince Leopold.

When she was nine, an event occurred that led to complete separation from her mother. Caroline was accused of the terrible and treasonable crime of having an

illegitimate baby. Though declared innocent by the so-called "Delicate Investigation", she was never granted the full reward of innocence. As Charlotte grew up, the breach between her father and mother widened, her mother's conduct became even more recklessly undignified, indiscreet and suspect, and the daughter's confidence in her mother must have been shaken. When she "came of age" at 18, her mother appealed for a closer association, but without success, and in 1814 the wretched and persecuted woman left England to live on the Continent.

But sentiment governs the world, and the people, especially when they were mourning for Charlotte, were roused to exasperation by the persecution of her mother. The unpopularity of the Regent was at its height; he was pelted on his way to the Houses of Parliament and on another occasion a man put his head in at the carriage window and cried, "Prince, where's your wife?"

But the height of the nation's tragedy was that with her seemed to die the direct succession to the Crown.

> "... in the dust
> The fair-haired daughter of the Isles is laid,
> The love of millions, how we did intrust
> Futurity to her ..."

In those lines Byron summarizes the two-fold theme—how the people loved her and how their hopes for the succession were destroyed.

We must remember that her grandfather, George III, although he had seven sons and five daughters, had only one legitimate grandchild—Charlotte. There was scant likelihood of more offspring from the Regent; he was 59, excessively corpulent and otherwise decayed and, besides, even if Caroline did oblige by dying it was doubtful if any other Princess could be found with the inclination or courage to marry him. As for Charlotte's six uncles, the prospect also seemed bleak.

The Duke of York had had 26 years of childless marriage and was 54. The Duke of Clarence, later William IV, was by no means childless; the ten little Fitzclarences lived at Bushey Park with their handsome mother, Mrs. Jordan, a devoted mistress and mother. The Duke of Kent had had 27 years of domestic bliss with Madame St. Laurent. The Duke of Cumberland, said to be the most unpopular man in England, had been two years married to his cousin, a Princess of 40 years and doubtful virtue; everyone hoped that their marriage would remain childless. The Duke of Sussex, the only uncle who took Charlotte's part against her father, had married a commoner when he was 20, and when she died, 37 years later, defied the Marriage Act a second time by marrying another. The Duke of Cambridge, the youngest, was only 43, irreproachable and unattached, and in him there seemed to lie some hope.

Of the daughters of George III, whom the Marriage Act hit far harder than it did their brothers, two were married and childless, two were secretly married but not childless, and one was unmarried and 49.

One wonders if ever there could have been, maritally, so tragic a family. It is clear that the Marriage Act, as applied so rigidly and exclusively by the King, had all but brought the Royal Family to disaster.

It is easy to see how the regrets of the nation at the loss of Charlotte were enhanced by the prospect of the importation of a foreign monarch. Failing offspring from the elderly uncles and aunts the crown would ultimately pass to the Duke of Brunswick, then a boy of 13 and mentally weak. What did happen was that the Royal Dukes discarded their mistresses and scrambled for German brides and

handsome grants from Parliament, with the result that two children were born.

The Duke and Duchess of Cambridge had a son, whose succession, however, was set aside two months later by the birth of the Princess Victoria to the wife of the elder brother, the Duke of Kent.

Medical History

The Old Sources of Information

Anyone who has tried to discover anything new about Charlotte's confinement has had to give up in despair. The authentic sources of information are scanty and already well explored, whilst the larger amount of material has, heretofore, been found only in sources which, to a medical historian, are suspect but which, nevertheless, have proved most tempting to Charlotte's many biographers. It is refreshing to see a medical appendix, revised by obstetric experts, in the recently published biography by Miss D. M. Stuart.

The only reliable information is that which was given by the four doctors concerned; Sir Richard Croft, the accoucheur, Dr. John Sims, the consulting accoucheur, Dr. Matthew Baillie, the Royal Physician, and Sir Everard Home, Sergeant Surgeon to the King, who examined and embalmed the bodies of Charlotte and her baby.

A few words about the doctors. Croft, Baillie and Home make a compact little family group. Home was a brother-in-law of the Hunters, Baillie was their nephew, and Baillie and Croft were brothers-in-law, having married the twin daughters of Dr. Thomas Denman, who dominated London midwifery in the Regency period.

The mystery man of the confinement was Dr. Sims. The *D.N.B.* describes him as a botanist and physician, and that is the right order of his activities. He was 69, and from 1801 to 1826 was editor of the celebrated Curtis's *Botanical Magazine*, which made great demands on his time and energy (Dopson, 1950). He was physician to the Surrey Dispensary and Charity for delivering Poor Women in their own houses, and was consulting physician to the Royal Ear Dispensary. Sims published many important papers on botany. The Mexican genus of compositae is named *Simsia* after him. He was an original member of the Linnaean Society and his herbarium is (or was) at Kew. One wonders how much time Sims had left for midwifery or if he really was a "celebrated accoucheur". It seems astonishing that he was chosen as the consultant when there were in London such active and skilful men as David Davis, Merriman and John Ramsbotham. He was scarcely of the calibre to help Croft in his anxious duties. Another odd thing was that when Sims arrived at Claremont he did not see Charlotte, and never entered the lying-in chamber until she was on the point of death.

The Authentic Documents

The only authentic documents, and they have long been known, are the following:

1. The reports published three weeks after the events in the two chief London medical journals. There can be no doubt that these were written in collaboration with the doctors and should be regarded as authentic. Their aim was to satisfy public opinion and end rumours.

2. The statement written at the time "for the satisfaction of the Royal Family." It was in general terms and was a private document, kept in the archives at Windsor, and unknown to the public until 1926, when a copy appeared among the Hunter-Baillie papers deposited in the library of the Royal College of Surgeons. The R.C.S. copy is in the handwriting of Mrs. Baillie and is headed "Dr. Baillie's account of Princess

Charlotte's labour". There are other reasons too that lead me to believe that Croft took no hand in drawing up this statement. To begin with, try and picture to yourselves what his state must have been—utterly exhausted and heartbroken, and in no fit condition to draw up statements. Moreover, in an unpublished letter to Croft, dated 9th November, Baillie writes: "I thought it proper to leave a copy of the general statement with the Queen and I enclose another which you should carry to Carlton House to the Prince Regent."

3. A long letter written by Sims on 15th November, 1817, to Dr. Joseph Clarke, of Dublin, which appeared, for no particular reason, in 1849 in the *British Record of Obstetric Medicine and Surgery*. It was republished in 1872 in the *Medical Times and Gazette* by Dr. W. S. Playfair, with copious comments. It is of interest in confirming certain points.

No amount of search into all sorts of likely and unlikely sources has brought anything more to light. Then, two years ago, having almost abandoned hope, I had the good fortune to be introduced to a great-great-grandson of Sir Richard, the present Lord Croft, who, I found, was as much interested in the association between Charlotte and his ancestor as I was. He had just found some important letters. A little later I was fortunate enough to meet also Major Richard Croft, another great-great-grandson, who had just discovered some even more important documents, and into whose possession all the letters and documents have now passed.

Both Lord Croft and Major Croft are here this afternoon and I am sure you would like to join me in thanking them for the honour they have done your lecturer in entrusting him with the precious information these documents contain and for permitting him to give it to the College.

But before dealing with the new material I wish to run through the story as it was known at the time and up to now, and particularly the way it was put across to the public.

How and What the Public were told

It is remarkable how little the doctors told; on the other hand, it was a family bereavement, though on a National scale, and as such was a private affair.

Apart from the three bulletins and the notice in the *London Gazette** the public had to rely on second-hand newspaper reports and on the semi-medical "letters from Claremont" undoubtedly sent to the Press by a gentleman called the "Court news man" (we should nowadays call him a "Press representative"), which were printed by most of the newspapers but seldom by *The Times*. An extra bulletin printed in *The Times* for 6th November, amongst the three official bulletins, is guarded by the description, "Also a bulletin of less authority than the preceding, from the Court news man." *The Times* of those days evidently had the same high standard of journalistic integrity as it has today.

It was the manner in which the story was slowly, imperfectly and inaccurately unfolded that gave rise to the outburst of public anger at the time and to the confusion and misrepresentation that has gone on ever since.

The Pregnancy

Early in July the newspapers announced that the accouchement was expected in October.

In a letter dated 19th October from Claremont, from Croft to his sister, he writes, "This is the first day I could by

* *v. infra.*

reason expect H.R.H. to be put to bed." In one of the new Croft letters, dated 14th March, Charlotte tells Croft that "the 2nd period is now safely past over a week." She seems to have been well throughout; even the critical Stockmar records that "the Princess passed through the whole of her pregnancy without any drawbacks". Prenatal care was still primitive, but we have now, in the new Croft papers, a copy of his simple directions. She was to rise at 9 and take breakfast before 10; to eat a little cold meat, or some fruit and bread at lunch about 2; to take food plainly cooked and easy of digestion at dinner; to take exercise, both walking and on horseback every day that the weather was fine, but the exercise should not be violent; to use the shower bath every other day and to begin with the water tepid, and to have the loins sponged with cold water daily.

Charlotte was sometimes bled during pregnancy. In a letter of 10th August to Croft, she writes, "I am certainly much the better for the bleeding." In "a letter from Claremont" that appeared in the newspapers on 22nd October, no doubt from the Court news man, we read that she had occasionally suffered a little from headache, for which it had been necessary at different times to extract blood. The letter goes on to state that on one occasion four incisions were made in the arm without effect from the veins being deeply buried, and that after a consultation the blood was ordered to be withdrawn from a vein at the back of the hand, "where the operation has several times been successfully performed by Mr. Neville, with great relief to H.R.H." This is the sort of unauthentic stuff that I find hard to believe. (Mr. Neville was the surgeon and apothecary attached to Claremont.)

As the public were becoming anxious, expecting hourly the accouchement to take place, the newspapers on 21st October were told that Charlotte was very well and continued to take daily exercise. From that date daily reports were sent out. Mrs. Griffiths, the nurse, had arrived at Claremont on 1st October, and Sir Richard resided at Claremont for three weeks waiting for labour to begin.

Labour

On Tuesday, 4th November, a letter, evidently from the Court news man, announced that labour had started the previous evening.

The next day (Wednesday, 5th November) three brief bulletins were sent out from Claremont over the names of Baillie, Sims and Croft. The first, at 8 a.m., stated that labour was going on slowly but favourably. The next, at 5.30 p.m., stated that labour had considerably advanced during the last three or four hours and would, it was hoped, within a few hours be happily completed. At 10 p.m., a third bulletin announced that Charlotte had been delivered of a stillborn male child and was "doing extremely well".

After that not another word from the doctors; a curtain came down. The news of her death reached the public about midday on Thursday, 6th November, in a special issue of the *London Gazette*, the gist of which was that about three and a half hours after delivery H.R.H. was seized with great difficulty of breathing, restlessness and exhaustion, "which alarming symptoms increased until half past two in the morning when she expired. . . ." The morning papers had gone to press too early to include the fatal news, but the next day they startled the public with their heavy black borders. They also printed two "letters written from Claremont" timed at 6 o'clock and 9 o'clock on the morning of the 6th, containing what were called "painfully interesting details". They must have been written by our friend

the Court news man. They stated that labour began on Monday night; that during Tuesday the labour advanced slowly, and Dr. Sims was sent for. On Wednesday morning labour advanced more quickly and at 9 p.m. the child was born. At about a quarter past twelve the medical gentlemen retired to their bedrooms; for they considered she wanted no more assistance than Mrs. Griffiths, the nurse, could render her, and that during the remainder of the night she should be kept as quiet as possible. She took some gruel, but found a difficulty in swallowing it. She then complained of severe chilliness and a pain at her stomach. Mrs. Griffiths instantly called up the doctors, but human assistance was of no avail and Charlotte expired about half past two in a severe attack of spasm.

It is not easy to realize that in this great national disaster that was all the public and the profession were allowed to know—a second-hand medley of truth, half-truth and supposition. If only they had been told that after the baby's birth there were complications that led to haemorrhage and that in spite of all that could be done the haemorrhage would not stop and she died from its effects—or something like that—how different would have been the subsequent course of events. Even today, in spite of modern technique, about 20 per cent of women who die in childbirth die from postpartum haemorrhage and shock. Surely, in those days of, relatively, primitive practice, no leading accoucheur need have been ashamed of losing a postpartum patient.

But the public, almost hysterical with grief, became alarmed. They believed that the truth was being hidden. Rumours were quickly afloat, a campaign was started; letters and paragraphs appeared in the newspapers and there was much talk and gossip at all levels. The doctors were accused of ignorance, mismanagement, neglect. Poor Croft had to bear the force of the storm. He was accused of lowering Charlotte in pregnancy by excessive bleeding and a low diet; of starving her for the 50 hours of labour; of not allowing Sims to come into the room until the final moments, and of going to bed and leaving her in charge of the nurse, only to be called up to find her dying. For none of these charges is there a jot of reliable evidence.

The medical attack was led by Jesse Foot in a letter to the *Sun Newspaper*, on 13th November, entitled "On the necessity of a Public Inquiry into the cause of the death of Princess Charlotte and her Infant". Foot was a well-known surgeon with a great belief in his own merits. He tried to surpass John Hunter in fame, and failing that did all he could to defame him. His *Life of Hunter* shows jealousy on every page. His letter protested that the public could not remain satisfied with what they got from the newspapers and asked if it were really true that Croft and the others had gone to bed and left Charlotte with the nurse. As to what were called "spasms" in the letter from Claremont, he considered this a meaningless term purely to belong to the late John Hunter and to the lecture rooms in Windmill Street. He demanded a public inquiry.

Three weeks later the sensible thing was done and reports came out in the leading London medical journals. The Editors of the *London Medical Repository* began by stating that, being aware that the profession expected some account of the case, and having learnt that the physicians in attendance did not mean to publish any statement, they strenuously tried to get all possible information from dependable sources. Their exertions had been successful and their report could be regarded as strictly authentic.

Emphasis was laid on the irregular and

weak action of the uterus; Dr. Sims had concurred that the use of instruments was never indicated. The third stage complications were revealed for the first time. Half an hour after the delivery there was haemorrhage and Dr. Sims had agreed that manual removal of the placenta was necessary, which was done by Sir Richard Croft.

In describing Charlotte's final symptoms the Editors stated that the respiratory organs were evidently under the influence of spasm and continued in that state until she breathed her last. The report also gave a complete enough account of the postmortem findings, the most important of which was that a considerable amount of blood was found in the uterus. Two ounces of blood-stained fluid were in the pericardium.

In commenting on the immediate cause of death the Editors made two remarkable suggestions. Although it must have been obvious that death was due to the effects of haemorrhage, the Editors, nevertheless, drew two red herrings across the path of truth. One was that the fluid in the pericardium, however it came to be there, might have obstructed the due action of the heart. The other was their emphasis on the so-called "respiratory spasms". "We have been informed," they wrote, "that the whole of the Royal Family are liable to spasms of a violent description; and to this hereditary disposition and the increased excitability of the amiable sufferer, owing to the tedious nature of the labour, are we led to ascribe an event which . . .", and so on.

The speciousness of all this was easy to discern and the redoubtable Jesse Foot lost no time. In a second letter he mocked at the spasms—these were but the last symptoms of exhaustion from haemorrhage. Why did Home measure the fluid in the pericardium and stomach but not the blood in the uterus? Why was Baillie—our leading morbid anatomist—not present in the dissecting chamber? He could understand a community of sentiment between the Princess's doctors; for were they not all mostly related?—another tilt at Hunter, which marred an otherwise able letter.

There were other letters and pamphlets, some for and some against the doctors, and the controversy slowly faded out.

The New Croft Papers

These come under three headings:

(1) A number of letters written by Croft in 1790 from Paris, when he was an aspiring young accoucheur of 28, in attendance on Georginiana, Duchess of Devonshire, for her third confinement—when "the bachelor Duke" was born. The letters are of great interest in relation to later events because they suggest that Croft had not the degree of resolute self-confidence that is a desirable temperamental endowment of a Royal accoucheur and for which no amount of skill, experience and professional integrity can compensate at the critical moment.

(2) Nine letters written by Charlotte to Croft and Baillie during pregnancy. That they are, unfortunately, an incomplete series is known because on the paper band securing them is written, "Some of these have been destroyed" initialled by Croft's two executors, his brothers-in-law, T. Denman (the future Lord Chief Justice) and M. Baillie. Some are undated. Two have been referred to—the one dating a last menstruation and the one about blooding.

(3) This group is the important one and comprises four documents: (*a*) Croft's personal record of the labour. For the first time we are told the duration of the first and second stages, and can follow the progress of the first stage from four vaginal examinations, and of the second stage from the time when perineal pressure began. There

are full notes of the conduct of the third stage. (*b*) His reflections on the general course of labour and his views on the cause of death. (*c*) His prenatal instructions on diet and exercise. (*d*) A copy of the post-mortem report.

I shall now describe the labour, making use of all the authentic material, old and new.

The Labour—The Full Story

About 7 o'clock in the evening of Monday, 3rd November, 42 weeks and 1 day from Charlotte's last "recovery", there was an escape of liquor amnii and labour pains soon followed.

At 11 p.m., Croft examined and found the os uteri the size of a halfpenny. The pains were coming every 8 or 10 minutes, but very weak.

On Tuesday, 4th November, at 3 a.m., Charlotte was seized with a violent attack of retching and Croft, thinking that this might hasten labour, sent for the Officers of State and Matthew Baillie. The Archbishop of Canterbury, the Bishop of London, the Lord Chancellor, the Home Secretary, the Chancellor of the Exchequer, the Secretary for War, and Baillie all arrived, in their coaches-and-four, before 8 a.m.

The lying-in chamber, Charlotte's bedroom, was a corner room with large windows on two sides. Fortunately the room was at the back of the house, but she must have heard the clattering and rumbling of the coaches. Two doors opened into the room, one into Prince Leopold's dressing room, occupied by Sir Richard Croft, and the other into the "breakfast room", where the Archbishop and Ministers sat, awaiting the event; this room led into the big gallery and other principal rooms. We cannot doubt that everything was done to give Charlotte peace and quiet during the 40 hours the Archbishop and Ministers kept their vigil. But there must have been a lot of coming and going and talking, and the conditions cannot have been ideal for labour.

From whatever cause, the pains continued insufficient; in general, during the first 24 hours, though weak, they were sharp, acute and distressing, at intervals of about 8 minutes and but little advancing the labour.

Nevertheless, labour progressed, and at 11 a.m., after 16 hours, the os uteri was found the size of a crown piece with thin margins. At this point it would seem that Croft began to be worried, finding that the uterus was acting irregularly, and that unless the pains improved in the course of the next 12 or 18 hours, some assistance might be necessary or some circumstances might arise to make consultation desirable. Moreover, he felt, it would be improper to use instruments without a consultation. It had been settled before that Dr. Sims was to be the consulting man in case such should be required. He therefore wrote a note to Sims, though he held back sending it till later, probably because the pains began tc improve.

Croft made another examination at 6 p.m. (Tuesday, 4th November) and found that the os had gone back over the head except just under the symphysis pubis. The labour continued progressive and at 9 p.m. he found that the os uteri had perfectly retired and for the first time an ear of the child could be felt.

Croft must now have had a feeling of great relief. In spite of poor pains, the first stage had lasted only 26 hours, the head was low, Charlotte was well. Nevertheless, as the pains continued unusually feeble he sent his note to Sims summoning his immediate attendance. What made him feel over-anxious? It was, I think, that the uterus was still acting inertly and irregularly, and he knew what the later consequences might be.

Sims arrived at 2 a.m. on 5th November, after the second stage had then been going of for five hours. Croft told him the details and proposed that he should be presented to Charlotte; but both Baillie and Sims considered this unnecessary and she was not told of his arrival. He remained in the next room, where he was told regularly of the state and progress of the labour and was at hand to see Charlotte whenever it might be thought necessary. Labour by then was advancing more favourably, though progress was very slow. It was allowed to continue naturally; the patient was in good spirits, the pulse calm. Instruments were in readiness "but the employment of them never became a question."

From about midday on Wednesday, 5th November—that is, after the second stage had lasted for 15 hours—the uterine discharge became of a dark green colour, which made the medical attendants suspect that the child might be dead or be born in a state of suspended animation.

At between 3 and 4 p.m., the second stage having lasted for 18 hours, the child's head began to press on the external parts; and at 9 p.m. the child was born, by the action of Charlotte's pains only.

The child, a 9-pound boy, was dead, and had evidently been dead for some hours, for the navel-string was very small and of a dark green or black colour. Nevertheless, every known method was made by Sims to reanimate it.

To sum up, the labour up to the time of delivery had lasted 50 hours, comprising 26 hours of first-stage and 24 hours of second-stage, including 5 to 6 hours of perineal pressure. The second-stage pains had been no more efficient than those of the first.

Croft states that Charlotte showed no signs of deficient strength during labour. She had taken some repose in bed during part of the nights of 3rd and 4th November, but was generally up and frequently walking about the rooms during the daytime and remained up until a short time before delivery.

The Third Stage

About 10 minutes after the birth of the child, Croft found that the uterus was still acting irregularly. He informed Sims that he suspected hourglass contraction with the placenta in the upper part, for he could not feel the placenta and the uterus continued high. They agreed that nothing should be done unless haemorrhage came on. In another 20 minutes haemorrhage did come on and Sims agreed that the placenta should be taken away. This was done before much blood had been lost. In passing his hand, Croft met with some blood but with no difficulty till he got to the contracted part of the uterus; and though it was contracted so as to admit only the points of three fingers, and had a portion of the placenta embraced by it, it readily gave way, so as to allow his hand to pass with tolerable ease, and he peeled off the near two-thirds of the adhering placenta without difficulty, and before much blood appeared to be lost.

Immediately on its being separated Charlotte complained of violent pain ("the strongest pain of the whole labour"), and the upper part of the uterus contracting on his hand, Croft grasped the placenta and gradually brought it down into the vagina. Leaving it there he went again to Sims and the Council and reported what he had done. On returning, he found Charlotte complaining of pains which recurred at intervals, and when these had continued to 10 o'clock, or about 25 minutes from the time the placenta was left in the vagina, as she complained of it giving her great inconvenience and that it was considerably protruding, he took it

away, and this was followed by a very moderate discharge of either fluid blood or coagulum. At this time, as well as he could determine by feeling the abdomen through the bandage, the uterus appeared moderately contracted.

Charlotte appeared quite as well as women commonly do after so tedious a labour, and much better than they often do under such circumstances, and for the next two hours Croft felt no apprehension, as she took plenty of nourishment, made few complaints and had a pulse not exceeding 100.

But at about a quarter to twelve there was a change. She became a little sick and complained of a singing noise in her head, so he gave her a little camphor mixture which she shortly afterwards brought up. After this she took a cup of tea and seemed to sleep for about half and hour, when finding her becoming irritable and restless and speaking too much, he gave her 20 drops of laudanum in wine and water.

About a quarter to one (6th November) she complained of great uneasiness in her chest and great difficulty of breathing. Her pulse became rapid, feeble and irregular. She became extremely restless, not being able to remain a single moment in the same posture. The most active support by cordials, nourishment, antispasmodic and opiate medicines was given. This very alarming state continued and kept increasing until, at half past two in the morning, Charlotte died.

It was then the custom of the Sergeant Surgeon to embalm members of the Royal Family. As, during the process, every organ, including the brain, was removed and treated separately, it amounted to a complete postmortem examination. On 7th November Sir Everard Home went to Claremont for the purpose. The uterus was found to contain a considerable quantity of blood and extended as high as the navel, and the hourglass contraction was still very apparent (Croft gives the amount of blood as "about a pound," but he was not there). The pericardium contained two ounces of red-coloured fluid. The child was well formed, and every part of its internal structure was quite sound.

Croft comments as follows: "The cause of H.R.H.'s death, as it was quite unexpected until half past twelve, so it is still somewhat obscure. The symptoms were such as precede death from haemorrhage; but the quantity of blood lost was scarcely sufficient to create any alarm, being less than usual on such occasions, yet, added to about a pound of blood found in the cavity of the uterus, might have been enough to produce the unfavourable symptoms in so excitable a constitution. It is most possible that the two ounces of fluid found in the pericardium were poured out during the violence of the spasmodic affection of the chest, and if so it must have had very great influence in preventing the heart from recovering its regular and vigorous action, and it is possible it might have been deposited earlier and thus have produced all the distressing symptoms, and have had more to do with the fatal issue than has been imagined."

The Labour in the Light of Contemporary Practice

The management of Charlotte's labour must be judged in the light of the midwifery practice of the day. The chief criticism is that Croft allowed labour to go on so long without using the forceps. But, by the principles and rules of contemporary practice, he was not wrong. To realize the astonishing degree of conservatism that prevailed at that time one must read the standard textbooks.

It seems that after Smellie had retired from practice, about the year 1760, the

forceps began to be used too freely, often by unskilful men, and much damage resulted. This period of abuse reached into the time of William Hunter (who died in 1783), Osborne and Denman, all of London, with the result that they reacted—indeed over-reacted—strongly, and an ultraconservative phase of midwifery practice began.

This retrograde phase in the evolution of obstetrics will be found discussed in the Transactions of the Obstetrical Society of London for 1879, when Robert Barnes opened a discussion which spread over three meetings. As Barnes well said: "These illustrious men thought it right to exert all their authority in discouraging the use of instruments, and in inculcating blind faith in nature as the better way. So earnest was their zeal, so commanding their authority, that men were driven into the opposite extreme of supine inaction . . . Rules were laid down, and widely obeyed, which too often allowed parturient women to drift into danger, injury and death."

This was the system into which Croft was born. He was trained by the renowned Denman, whose assistant he became, whose daughter he married and whose practice he inherited. It was natural that he should be a faithful adherent of the Denman system. Denman's famous book *An Introduction to the Practice of Midwifery*, first published in 1788, was a sort of obstetrical bible. As edition succeeded edition, Denman's doctrines were not modified—if anything, they were fortified. I will take from the first edition a few excerpts pertinent to Charlotte's labour.

On the use of forceps he writes: "The use of the forceps ought not to be allowed from any motives of eligibility (i.e. of choice, election or expediency). Consider the possible mistakes and lack of skill in younger practitioners, and the instances of presumption of those who by their experience have acquired dexterity." . . . "When it is proposed to deliver with the forceps the intention is to supply the total want or deficiency of the natural pains of labour; to extract the head of a child that cannot be expelled by the efforts of the mother. But so long as those efforts continue with any degree of vigour, there is always reason to hope that they will ultimately expel the child. We are, moreover, to recollect that in long labours there will often be an abatement or a temporary cessation of the pains without any apparent reason, but that cessation of the pains, which is the consequence of long continued fruitless action, and of great debility is to be considered as the only justification of the use of the forceps."

Another rule: "A practical rule has been formed, that the head of the child shall have rested for six hours as low as the perineum before the forceps are applied, though the pains should have ceased during that time." (II, 128–133). This was known as "Denman's Law." But Denman must be credited also with the following aphorism: "Care is also to be taken that we do not, through an aversion to the use of instruments, too long delay that assistance we have the power of affording them."

The last edition of the book published in Denman's lifetime (1816) has the very significant sentence: "But if we compare the general good done with instruments, however cautiously used, with the evils arising from their unnecessary and improper use, we might doubt whether it would not have been happier for the world if no instrument of any kind had ever been contrived for, or recommended in, the practice of midwifery."

Under the third stage he writes: "For many years I have made it a rule to leave the placenta, whether naturally or artificially separated, to abide in the vagina

for one hour after it was voided out of the cavity of the uterus."

Under concealed postpartum haemorrhage (after the placenta is out) he writes: "Sometimes the size of the uterus, though contracted, shows that there are large coagula in its cavity. These coagula are supposed to keep up a distension of the uterus and cause a haemorrhage; and it is recommended to introduce the hand to dilate the cervix and clear them out from the uterus . . . This is not necessary and I have never practised it; nor even troubled myself with the state of the uterus unless it was inverted after the placenta was brought away; but have left whatever coagula it contained to be expelled by its own action."

If we put these quotations beside the main incidents of Charlotte's labour we have to admit that Croft acted strictly according to Denman. It is of interest that in the edition of Denman's *Aphorisms* published the year of Charlotte's death (and two years after his own) the title page is adorned with the apt quotation from the Book of Hebrews: "He being dead, yet speaketh."

Comments on the Labour

It seems hardly possible to doubt that Charlotte died of postpartum haemorrhage. Four haemorrhages are recorded, the first before the placenta was removed, the second during its removal, the third when it was taken from the vagina, and the fourth, the concealed haemorrhage in the uterus found after death. None was severe but their cumulative effect must have been considerable. Charlotte's symptoms, from near midnight until her death 2½ hours later, were typical of blood loss, slowly mounting, the lethal phase being a slow leak into the uterus.

I have told you of Denman's emphatic teaching, obeyed by Croft. But not all the accoucheurs of the day obeyed Denman. Merriman (1820), writing on "Haemorrhage after delivery cured by removing coagula from the uterus", describes a case he saw in consultation on 29th November, 1817. Some time after a normal labour the patient became faint and much alarmed at her situation, which she thought similar to that of an "illustrious Lady" who had recently died after delivery (Charlotte had died about 3 weeks before. She became cold and blanched, with rapid pulse. Merriman saw her 6 hours after labour. The uterus was larger than it should be, and therefore he passed his hand and brought away about 14 ounces of clot, upon which the uterus contracted and the patient recovered.

One must try and put oneself in Croft's place. His responsibility was enormous, unique. He was attending the accouchement of the, dynastically, most important young woman in the world—the Princess who was to be the Queen of the country that then stood supreme among the nations. The eyes of Britain, of Europe, of the world were fixed on Claremont, on what was about to happen there, and on the two leading figures—both, in the end, so tragic—Charlotte and her accoucheur.

I have already given my view that Croft was a diffident, sensitive man without much self-confidence despite his skill and experience. He was not the sort of man to deviate from his rules of practice by doing something unconventional and perhaps risky. There is evidence that from the start he was over-anxious. He sent for the Archbishop and Privy Councillors far too soon, just because there was an attack of retching; he wrote a note to Sims hours before he sent it. He was a lonely man in the lying-in chamber. Sims was no good to him. Sims would not go into the room.

We may say that both Charlotte and

Croft were the victims of a system. That was what, in as many words, was said by Dr. Stockmar who knew nothing of practical midwifery, but was an uncommonly clever man. "It is impossible," wrote Stockmar, "to resist the conviction that the Princess was sacrificed to professional theories." But the Princess and her accoucheur were not only the victims of a system. There was something far worse. They were caught in the toils of a most difficult and dangerous labour.

Why was the second stage so long? On and on it went for 24 hours in spite of uterine contractions. We can rule out disproportion and the occipito-posterior positions. Croft knew all about these and would not have omitted to mention them in his detailed record. To account for the long delay we are left with uterine inertia—the hypotonic variety, and the hypertonic variety that may go on to the formation of a constriction ring. For those who believe in the psychologic aetiology of this condition, there is the life-long emotional stress from which Charlotte suffered. There was, besides, for her, a feeling of great personal responsibility, knowing that her accouchement was critical for the monarchy and the nation, a feeling not lessened by the presence of the high officers of State.

It is odd that though Smellie so well described delay in birth "due to contraction of the uterus below the shoulders of the child," some of his successors, including Denman, left it out of their books. Denman knew about irregular and asymmetrical uterine action and described it well, and of course he knew all about hourglass contraction in the placental stage.

Croft found Charlotte's uterus contracting inertly and irregularly throughout most of the time, and the pains were sharp, acute and distressing without advancing labour very much; in the placental stage he had to dilate an hourglass contraction to take the placenta away, and after death the ring was still there. It is justifiable, I think, to suggest that the remarkably long second stage was due to a constriction ring that in the end proved slowly reversible. If so, how fortunate that Croft did not attempt forceps delivery. We must leave it at that. It is unlikely there will ever be more exact data for finality.

I hold no special brief for Croft; but I cannot imagine an obstetrician who suffered more cruel misfortune, more undeserved criticism nor more false accusations. "May God grant that you nor any connected with you may suffer what I do at this moment," he wrote next day to Stockmar.

The new documents, as well as a close study of the old, have, to my mind, shown that if he erred it was only by sticking too closely to accepted rules and principles. And, in such circumstances and with such a patient, who would have acted differently?

Three months later Croft shot himself whilst attending a patient, the balance of his mind disturbed with depression and despair at the blame cast upon him, and that is why I name my lecture "A Triple Obstetric Tragedy" — mother, baby, accoucheur, all dead, all victims, most likely, of a mistaken system, a bad patch, a veritable craze of midwifery practice.

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A PERINEORRAPHY OPERATION AND ITS USE IN THE TREATMENT OF ENTEROCELE AND RECTOCELE

BY

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INTRODUCTION

POSTERIOR repair consists of the removal of a variable amount of posterior vaginal wall combined with suturing together the two levator muscles in front of the rectum. In addition some surgeons join together the superficial muscles of the perineum. With rectocele and enterocele the utero-sacral ligaments together with their downward prolongations on to the ground bundle are stitched together and sometimes pleated. With severe prolapse the utero-sacral ligaments are usually found to be weak and ill defined and do not always give efficient support. If the two levator muscles are sutured together very far forward the length of the vagina is reduced. The thickened fascia which lies in front of the rectum and below the level of the levator muscles which is usually called the prerectal fascia is sometimes stitched either to the shelf formed after a vaginal hysterectomy or to the back of the uterus if the uterus is conserved. The fascia itself is adherent to the levator muscles and we do not believe that it offers a very efficient support although it holds back the bowel when the later stages of the repair are being carried out.

OPERATIVE TECHNIQUE

At operation, in cases of rectocele and enterocele, a transverse incision is made along the fourchette and joined to a midline incision in the posterior vaginal wall. The midline incision is extended upwards as far as the cervix and the lateral vaginal flaps dissected clear of the underlying tissues with a scalpel. Above the level of the prerectal fascia, in the midline, lies the clear recto-vaginal space, on each side of which lie the downward prolongations of the utero-sacral ligaments. These pass into the ground bundle of the endopelvic fascia which lies on the upper surface of the levator muscles. At operation, the two levator muscles are identified by sight and their surfaces dissected clear. The muscles are covered with layers of pelvic fascia. It is possible with a finger to strip the ground bundle away from the upper surface of the levator muscle on each side. In postmenopausal patients the stripping is simple and can be done with a finger, and large vessels are not encountered. On the other hand, in some patients, though by no means all, who are in the childbearing period of life, a fair amount of venous oozing may be encountered but not of any particular severity. The ground bundle can now be sutured together in front of the rectum and at its upper end can be sutured either to the back of the uterus or to the shelf formed after a vaginal hysterectomy. Furthermore, a second or even third layer of reefing sutures can be introduced. The

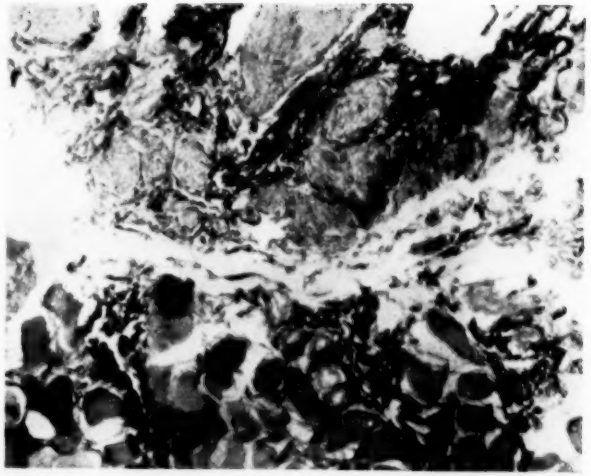

FIG. 1

Running transversely across the middle of the photograph is the line of cleavage between the levator muscle below and the levator fascia above. The section has been stained with Van Gieson and Sheridan. The levator fascia consists of plain muscle together with fibrous tissue and a relatively large amount of elastic tissue.

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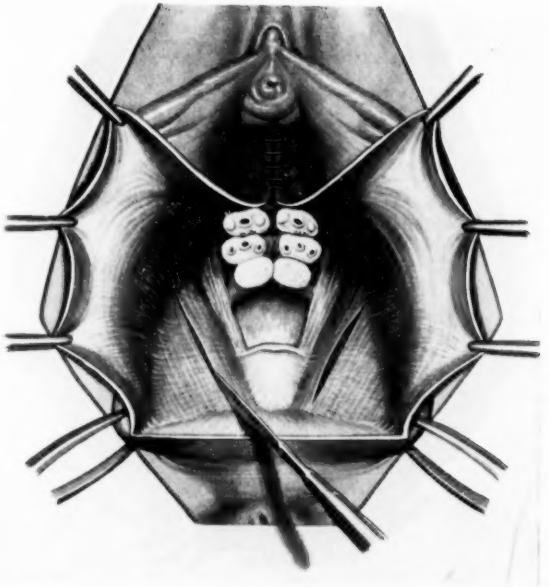

FIG. 2

After vaginal hysterectomy, the posterior vaginal wall is separated from the underlying tissues. (See also Fig. 4.) The stumps of the pedicles lie above the recto-vaginal space. The pre-rectal fascia with its upper margin lies between the two levator muscles and is attached to the levator fascia. The ground bundle is drawn diagrammatically. The incision is made on each side through the levator fascia parallel to the muscle fibres.

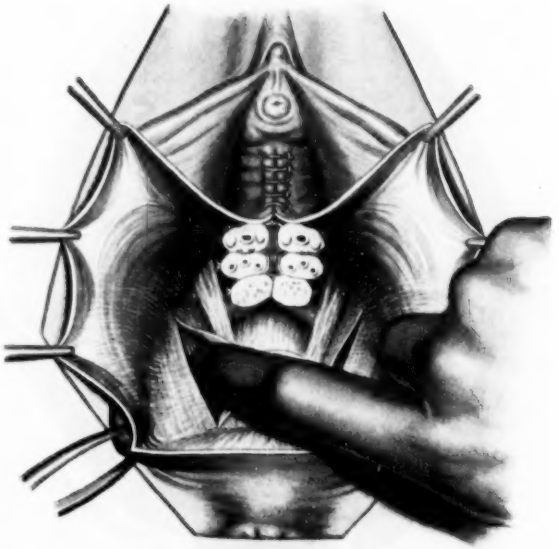

FIG. 3

With the index finger, the levator fascia is stripped from the levator muscle and, after the edge of the muscle has been reached, the finger is flexed at right angles to the direction of the muscle bundle and strips the fascia laterally. If the fascia is stripped mesially, the rectum may be damaged.

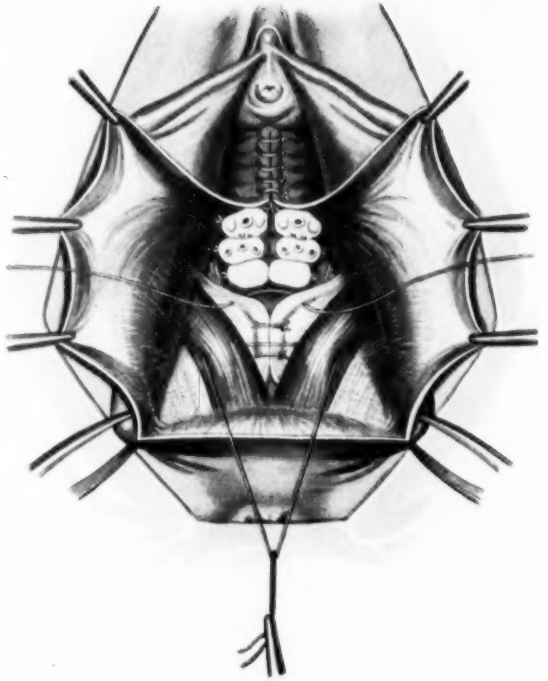

FIG. 4

The mobilized levator fascia now forms a strong layer. The edges are sutured together and a second layer of overlapping interrupted stitches can be introduced. The upper edge of the pre-rectal fascia is included in the lower suture. At the upper end a suture, in addition to the one shown, passes through the pedicles of the utero-sacral ligaments. The levator muscles are then sutured together in the usual way.

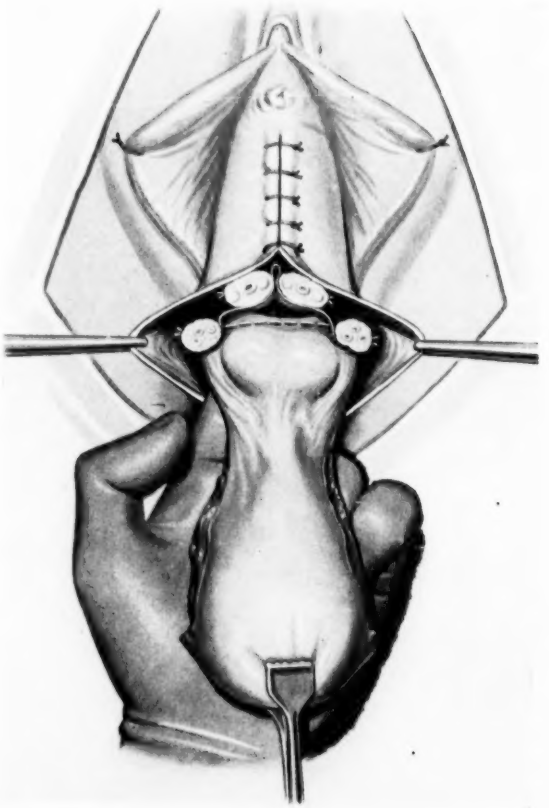

FIG. 5

Hernia of Doug'as's pouch treated by vaginal hysterectomy. An anterior colporrhaphy has been performed and the uterus has been drawn down through the utero-vesical pouch. The pedicles of the round ligaments, Fallopian tubes and ovarian ligaments have been stitched together below the bladder and the uterine vessels pedicle has been ligatured on each side. The uterus is drawn down with the right hand and the two fingers, placed in the posterior fornix, are flexed forwards and expose the Douglas's hernia. The upper limit of the hernia posteriorly is exposed and the peritoneum divided at the base of the sac along the dotted line. The upper edge of this cut peritoneum is sutured to the pedicles which lie in front and the peritoneal cavity is closed. The utero-sacral ligaments are then clamped and divided and sutured together (see Fig. 2).

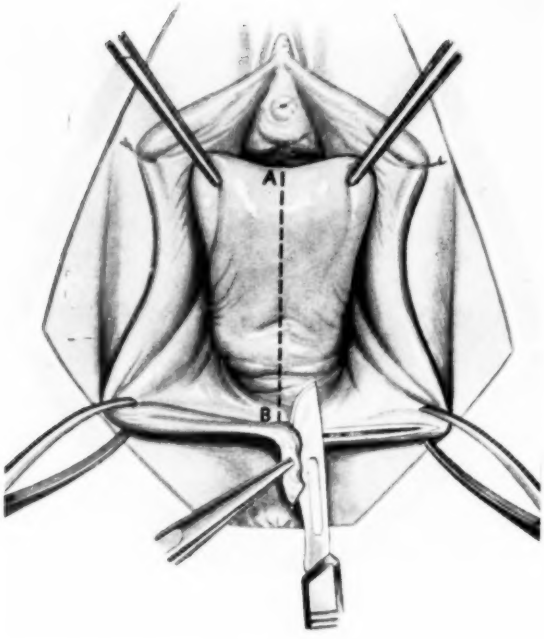

FIG. 6

After the procedures of Fig. 5 the posterior vaginal wall is drawn upwards and the posterior vaginal wall incised to allow the lateral flaps to be drawn apart (as in Fig. 2), clamps being placed on each side at A and B. These are illustrated in Fig. 2.

shelf which is thus constructed consists of the ground bundle, the downward prolongations of the utero-sacral ligaments, together with the upper part of the utero-sacral ligaments themselves. In other words, instead of utilizing the utero-sacral ligaments alone, a thicker and firmer shelf of tissue is obtained. This method has been employed for some time and the results obtained have proved to be extremely good. In the first place, the shelf is inclined at an angle of about 30–45° to the levator shelf, which allows a long vagina to be constructed. An opening can be left between the two muscles in front, sufficiently wide to admit two fingers. Furthermore, the amount of vaginal wall left behind can be made sufficiently great to leave a functional vagina above the level of the levator muscles.

Some time ago we were working on the pelvic fascia and found in microscopical sections taken through the pelvic fascia covering the levator ani muscles that a space can be identified between the pelvic fascia itself and the underlying levator muscle (Fig. 1). It seemed possible therefore that this thick condensed fascia could be stripped away from the upper surface of the levator muscle. The technique is as follows:

After the levator muscles have been exposed, the levator fascia is cut through with a scalpel along its inner border (Fig. 2) parallel to the muscle fibres and with a finger the fascia is stripped away from the underlying muscle (Fig. 3). The separation is extremely simple and only in one case has there been any difficulty and this was because the patient had had previous operations for repair. It is, however, essential that the levator muscles should be dissected clear of the superficial attachments, and the inner borders must be identified by sight and not by touch. During the separation of the fascia from the muscle, it must be remembered that the fascia is being stripped from the upper surface of the muscle. If the finger is pushed through the levator fascia the rectum may be wounded on the left side. Again, if the correct layer is not reached and the muscle fibres are separated from each other, a moderate amount of venous oozing may arise. We take the view that the upper limit of the prerectal fascia should be included in the lowest suture employed to draw together the mobilized levator fascia of each side (Fig. 4). A much stronger and firmer support is obtained than when the ground bundle of the endopelvic fascia is used alone. Two or even three reinforcing layers can be used when necessary. The support is firm and strong and, we believe, far stronger than any other layer which can be found in this area. The method of suturing the upper end of the shelf varies with the particular operation of prolapse that has been performed. These will be described in detail later in the paper. The two levator muscles are then sutured together in the usual way and this layer of sutures can be introduced with the greatest of ease as the two muscles are admirably mobilized. It should be emphasized again that the levator fascia shelf has a completely different inclination from the inclination of the levator muscle shelf. External to the levator muscles, the superficial muscles can be drawn together when necessary.

Certain advantages are claimed for the technique. It is extremely simple and the levator fascia is firm and fibrous. The fascia can be mobilized far out laterally without risk of injury to any important structure. Its inclination enables a long and functional vagina to be fashioned and the results obtained up to the present compare admirably with those obtained from the previous method of utilizing the ground bundle.

The Operative Treatment of Enterocele and Rectocele

Aetiology. Cases can be grouped into those encountered before prolapse operations and those which develop after gynaecological surgery. A Douglas's hernia is often found in complete procidentia and sometimes develops even when the uterus is well supported. It is a relatively common sequel of ventrifixation, arises fairly frequently after vaginal hysterectomy for prolapse, yet relatively rarely after Fothergill's operation. Some of the worst cases are seen in complete extroversion of the vagina following upon abdominal hysterectomy. A full account can be obtained in the *Transactions of the Twelfth British Congress of Obstetrics and Gynaecology* in the papers of Read, Gemmell, Palmer and Gwillim. The prime causal factor is weakness of the endopelvic fascia together with laxity of the levator muscles. Usually there is increased intra-abdominal pressure because of adiposity as well. The same causal factors are at work in the development of rectocele. In both types of case the rectum and sigmoid are displaced downwards and forwards because of weakness of the endopelvic fascial supports of the bowel and in the treatment of both conditions special steps must be taken to hold up the rectum. If a rectocele develops to a sufficient degree, the peritoneum is drawn down with it and an enterocele is formed as well. Most gynaecologists would agree that the rectum and sigmoid are often hypertrophied in cases of hernia of Douglas's pouch. Another finding which is obscure is that the two levator muscles are widely separated in such a way that their inner edges have a concave arrangement, so that a large patulous opening lies between them.

The post-operative cases develop because the causal factors persist after the primary operation. If it has been a ventrifixation, the uterus is drawn forwards and a large unsupported space remains between the uterus and the bowel, through which Douglas's pouch is thrust downwards. The same factors are responsible for the cases which follow upon vaginal hysterectomy and the relatively low incidence after Fothergill's operation is because the uterus retains its central position and the space between the back of the uterus and the rectum is relatively small. Theoretically the supporting shelf, after an operation for prolapse, should extend backwards from the bladder as far as the rectum.

The factors which cause prolapse persist after operation and indeed may become aggravated so that an operation which gives good results for a few years may fail if the general asthenia becomes increased at a later date. The essential problems in all operations for enterocele and rectocele are:

(1) To cure the prolapse.
(2) To prevent its recurrence.
(3) To leave the vagina functional.

Technique

Complete Procidentia combined with Enterocele. A vaginal hysterectomy is performed. The usual procedure of bringing down the fundus through the utero-vesical pouch is adopted and what we call the post-urethral ligament is sutured to the peritoneum which covers the bladder. If necessary, reefing sutures are introduced into the ligament as well. The pedicles of the round ligaments, ovarian ligaments and Fallopian tubes are sutured together beneath the bladder to form a supporting shelf. The uterine arteries are clamped and divided on each side and the fundus of the uterus drawn downwards and backwards. This exposes the utero-sacral ligaments and also Douglas's pouch. Two fingers of the left hand are now placed in the posterior fornix and push up Douglas's

pouch (Fig. 5). The posterior peritoneum of the pouch is then divided transversely as high up as possible. The peritoneal cavity is closed by suturing the upper edge of this cut peritoneum to the peritoneum covering the bladder. The utero-sacral ligaments are now divided and sutured together. The fundus of the uterus is then drawn upwards towards the patient's abdomen and the posterior vaginal wall cut through in the region of the posterior fornix, which allows the uterus and Douglas's hernia to be removed. The pedicles of the utero-sacral ligaments can now be sutured to the supporting shelf below the bladder.

Attention is now directed towards the posterior vaginal wall. It is incised in the midline along the whole of its length and combined with the incision along the fourchette (Fig. 6). The lateral vaginal flaps are dissected away. The prerectal fascia is now exposed together with the widely separated levator muscles. Above this level lies the rectum and sigmoid which are displaced downwards and forwards. The essential problem is to fill the space between the supporting shelf in front and the levator muscles. One method is to separate the prerectal fascia from the levator muscles by incising the fascia on the under surface of the levators and to suture the upper end of the prerectal fascia to the shelf. This procedure is of very doubtful value for the fascia is usually thin and weak. Nevertheless it holds the rectum away from the operation area while the further procedures are being employed. The utero-sacral ligaments, together with their downward prolongations, are usually ill-defined and weak and we do not believe that the bowel is sufficiently supported if they are sutured together or overlapped.

The technique we adopt is to incise the fascia covering the levator ani muscle. The mobilized fascia is then sutured to form a support in front of the bowel and in its anterior part is stitched to the utero-sacral pedicles. A second layer of reinforcing sutures is introduced into the fascial support. The levator muscles are now sutured together as far anteriorly as to allow two fingers to be introduced through the aperture between them. At times we have introduced a tantalum wire suture in the most anterior part, for we believe that the main cause of failure of the operation is the subsequent separation of the levator muscles. A second layer of reinforcing sutures is always introduced into the levator muscles and an effort is made to suture the superficial muscles of the perineum together as well.

The amount of vaginal wall removed is of importance for upon it depends whether the vagina will remain functional. As a general rule a fair amount should be left behind and the edges of the vaginal wall are then sutured together in the midline.

Conversely, if it is not necessary for the vagina to remain functional, a large amount of vaginal wall can be removed. Furthermore, it is possible, by suturing the levator muscles to the shelf, to close the vagina almost completely and this elaborate procedure has the advantage over Le Fort's operation in that the patients always feel more comfortable.

Abdominal Operations

Abdominal operation for the treatment of hernia of Douglas's pouch has not been found necessary during the past 15 years. The method of suturing the top of the vagina to the fascia covering the promontory of the sacrum is only possible if the vagina is sufficiently long. We have used a method of suturing the thickened areas near the attachments of the utero-sacral folds to the bowel to the fascial tissues in front of the promontory in certain cases of prolapse of the rectal mucous membrane

and the method might be employed in certain cases of prolapse of the pouch of Douglas. Abdominal operation is not advocated for we believe that the bowel must be supported and we know of no satisfactory method except by removing part of the sigmoid.

Treatment of Enterocele and Rectocele when the Uterus Prolapses to a Minor Degree

The cases are different in type from those accompanying severe degrees of prolapse of the uterus. Sometimes they are seen after Fothergill's operation, sometimes they develop independently of any previous gynaecological operation.

If the uterus is well supported it should not be removed but should be conserved. If a Fothergill operation has not been employed previously the cervix should be removed and an anterior colporrhaphy performed. The posterior vaginal wall is incised in the midline along the whole of its length and combined with a transverse incision along the fourchette. The lateral vaginal flaps are dissected away, the pouch of Douglas identified and mobilized. The sac is opened, emptied, and the neck of the sac divided anteriorly along its attachment to the uterus and posteriorly along its fixed attachment to the rectum. The next step which is regarded as important is to suture the edge of the peritoneum which covers the rectum as high as possible on the posterior surface of the uterus by a series of interrupted sutures. In this way the rectum is drawn high up out of the pelvis. In severe cases of Douglas's hernia, it may be necessary to suture the wall of the rectum below the peritoneal level to the back of the uterus and, although the method leaves a raw surface inside the peritoneal cavity, no complications have been encountered as yet. The rest of the operation is as previously described, namely to suture the levator fascias together in front of the rectum to produce a levator fascial shelf and, in addition, to stitch the upper limit of this shelf to the back of the uterus. The vaginal wound is then closed as previously described. These cases always have a most favourable prognosis.

The Treatment of Complete Extroversion of the Vagina. Although these cases are usually treated by colpocleisis, satisfactory results can be obtained by adopting the same technique as for cases of complete procidentia associated with prolapse of Douglas's pouch. A midline incision is made in the anterior vaginal wall and a colporrhaphy employed. If the cervix has been removed, the peritoneal cavity is opened up and the stumps of the round ligament identified. If the ovaries and Fallopian tubes remain, they, together with the round ligaments, can be utilized to form a supporting shelf for the bladder. The posterior vaginal wall is then incised along the whole of its length and the utero-sacral ligaments identified together with their downward prolongations on to the ground bundle. The utero-sacral ligaments are stitched together and sutured to the supporting shelf below the bladder as well. The technique of stripping the fascial layers from the upper cervix of the levator muscles is again employed and it is of fundamental importance to suture the anterior limit of this muscle layer to the shelf below the bladder. A levatorplasty is then employed in the usual way. Again, the amount of vaginal wall removed depends upon whether the vagina is to be functional. We have obtained excellent results with this technique. Sometimes complete extroversion of the vagina develops after subtotal abdominal hysterectomy, when the cervix should be removed before the peritoneal cavity is opened up.

SUMMARY

(1) A perineorrhaphy operation has been described in which the pelvic fascia is separated from the upper surfaces of the two levator ani muscles and sutured together in front of the rectum. Additional reefing sutures can be introduced and a firm supporting shelf produced with a different inclination from that of the levator muscle shelf which is afterwards fashioned.

(2) At its lower angle the shelf includes the upper edge of the prerectal fascia. At its upper end the levator fascia shelf is sutured to the stumps of the utero-sacral ligaments after vaginal hysterectomy, and to the back of the uterus after amputation of the cervix.

(3) The procedure has replaced an older method which utilized the ground bundle of endopelvic fascia which lies on the upper surface of the levator fascia.

(4) The length of the vagina is not reduced by this operation.

(5) Methods of dealing with prolapse of Douglas's pouch have been described.

THE HISTORY OF PUERPERAL SEPSIS—CORRIGENDUM

BY

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THE history of the early studies of puerperal sepsis has been reviewed by Ricci (1945, 1949), in his recent work on gynaecology, who mentions Thomas Watson as having made "A most striking contribution to the aetiology and prevention" of this disease. Watson's first published contribution appeared in the *London Medical Gazette* on Friday, 18th February, 1842, as a lecture delivered at King's College, London. This lecture was subsequently reprinted in his "Lectures on the Principles and Practice of Physic", published in two volumes by John W. Parker, West Strand, London, in September 1843 (Watson, 1843). The modest introduction to these volumes begins by stating:

> The following lectures were put together with unavoidable haste during the Medical Session of 1836–37, in which they were first delivered. They were repeated with slight variations for four successive years, the author always meditating, but never finding time to accomplish, their thorough reconstruction and revision. They were afterwards printed, to fulfil a rash promise, in the pages of the *Medical Gazette*; and they are now published in a collected form at the request, formally conveyed to him in writing, of many who had heard or read them, including several of his colleagues at King's College.

Watson's punctilious fulfilment of his "rash promise" has actually given him historical priority of publishing the important observation in puerperal sepsis that infection can be, and frequently is, carried from one patient to another by the hands of the accoucheur, and that this can be prevented by disinfecting the hands with a chlorine solution. Moreover, although stressing contagion by inoculation—the contamination from the outside—because this is the preventible and hence practically more important form of contamination, Watson recognizes the possibility of contamination from within: decomposed matter and "products of inflammation may enter the blood vessels, and constitute the poison." Indeed a "striking" lecture is sufficiently interesting—beyond the narrow aspects of priority—to justify reprinting its pertinent passages (Watson, 1842):

> This awful disorder, *puerperal fever*, is more frequently accompanied *with inflammation of the peritoneum*, than with any other inflammation. . . . This variety of peritonitis forms part of a disease which, like continued fever, is a *general* disease, and results from contamination of the blood. This Dr. Ferguson has clearly established. The contamination may originate in the body of the patient herself; the noxious material being supplied by putrid coagula, or portions of the placenta, remaining in the uterus; or some of the products of inflammation may enter the blood vessels, and constitute the poison. And this it may be difficult, or impossible, to prevent. But, on the other hand, the contamination may arise in the way of contagion: this horrible malady may be communicated from one lying-in woman to another by the intervention of a *third person*: and doubtless it is so carried and propagated, in many instances, by midwives and accoucheurs. Now this source of the disorder may be obviated; and therefore it is the utmost importance that it should

be clearly recognized, in order that it may be carefully provided against.

You must know, however, that great differences of opinion have existed, and, I believe, still exist, in respect to the contagious quality of certain forms of puerperal peritonitis. . . . There are parties who regard the whole notion of contagion as a mere bugbear: and there are others who embrace in their allegations of contagion many more diseases than can be *proved* to be so caused. The same strong assertions are made, the same kind of eagerness is displayed (the same party-spirit, I had almost said) as mark the strife of ordinary politics.

. . . Indeed I believe that these cases of puerperal fever occurring in succession to the same practitioner, are examples of something more than ordinary contagion, operating through the medium of a tainted atmosphere. I believe them to be instances of direct inoculation. Recollect that the hand of the accoucheur is brought, almost of necessity, into frequent contact with the uterine fluids of the newly-made mother. Recollect—those among you who have examined the interior body with your own hands—recollect, with what tenacity the smell, thus contracted, clings to the fingers in spite even of repeated washings; and, whilst the odour remains, there must remain also the matter that produces it. Recollect how minute a quantity of animal poison may be sufficient to corrupt the whole mass of blood, and fill the body with loathsome fatal disease. Illustrations will occur to you in the inoculated small-pox, in hydrophobia, in the viper-bite, in the scratches and punctures of the dissecting-room. Recollect the raw and abraded state of the parts concerned in parturition; the interior of the uterus forming a large wound, and presenting, as Dr. Ferguson observes,* an exact analogy to the surface of a stump after amputation, the more external soft parts bruised and sore. . . . Recollecting these facts, you will see too much likelihood in the dreadful suspicion, that the hand which is relied upon for succour in the painful and perilous hour of child-birth, and which is intended to secure the safety of both mother and child, but especially of the mother, may literally become the innocent cause of her destruction: innocent no longer, however if, after warning and knowledge of the risk, suitable means are not used to avert a catastrophe so shocking.

I need scarcely point to the practical lesson which these facts inculcate. Whenever puerperal fever is rife, or when a practitioner has attended any one example of it, he should use most diligent ablution, he should even wash his hands with some disinfecting fluid, a weak solution of chlorine for instance: he should avoid going in the same dress to any other of his midwifery patients: in short, he should take all those precautions which, when the danger is understood, common sense will suggest, against his clothes or his body becoming a vehicle of contagion and death between one patient and another. And this is a duty so solemn and binding, that I have thought it right to bring it distinctly before you.

* In edition 3: " as Cruveilhier has observed "

Watson even suggested what has now become standard hospital practice as a method of asepsis in preventing wound sepsis, not only in obstetrics, but in general surgery as well.

In these days of ready invention, a glove, I think, might be devised, which should be impervious to fluid, and yet so thin and pliant as not to interfere materially with the delicate sense of touch required in these manipulations. One such glove, if such shall ever be fabricated and adopted, might well be sacrificed to the safety of the mother in every labour.

It is of parenthetical interest that Charles Goodyear developed the process of vulcanization of rubber by serendipity contemporaneously in 1839 and obtained a patent on it in 1844.

About two months after Watson's lecture appeared in the *London Medical Gazette*, Robert Storrs (1842) published in the *Provincial Medical Journal and Retrospect of the Medical Sciences* of 23rd April, 1842, an article entitled " History of a puerperal fever in Doncaster." Calling attention to erysipelas as a source of puerperal sepsis, Storrs presents clinical evidence of puerperal sepsis having been " produced from

the matter of abscesses" and "propagated from one individual to another, so that if a person be unfortunate enough to attend a case of the kind"—erysipelas, herpes zoster, typhus fever, as well as puerperal fever—"without great precaution, he may be liable to transmit it to others, whom he may be attending in the puerperal state. In many cases there is good reason to believe that it arises from attendance on postmortems, especially when there has been peritoneal inflammation."

The same aetiological factors are emphasized by Oliver Wendell Holmes in his memorable publication "The contagiousness of puerperal fever", which appeared just one year later, in April 1843. Holmes (1843) incidentally mentions both Storrs's paper and the leeture by Watson, whom he regards an authority on the subject. Storrs (1842) concludes his "History of a puerperal fever in Doncaster."

> I have no theory to establish, and I have merely added these few observations to the cases, that the subject might be more intelligible than a bare relation of the cases alone would have made it. Should the account ever prove a means of averting a similar calamity, I shall be amply repaid for the slight trouble of investigating the subject in this instance. None of my brother practitioners in the town had a case.

Robert Storrs never established a theory as such—but he solved the practical problem of preventing puerperal sepsis by completely developing its etiological concept and drawing the logical conclusions therefrom. His subsequent communication, appearing the following year, contains that fully developed concept: the range of pathological conditions that may cause puerperal sepsis is widened to include any "original infectious" disease and "the most careful ablutions of the hands" is deemed an indispensable preventive measure "after a postmortem of any kind. Antedating Semmelweis's (1847) earliest publication on the subject by four years, Robert Storrs (1843) published his "Observations on puerperal fever, containing a series of evidence respecting its origin, causes, and mode of propagation" in the *Provincial Medical Journal and Retrospect of the Medical Sciences*, of 2nd December, 1843. He begins:

> The subject of the contagiousness of puerperal fever has been taken up by our medical brethren in America, in a paper by Dr. O. W. Holmes, published in the *New England Quarterly Journal of Medicine and Surgery* for April 1843 . . . wherein he brings forward a strong array of evidence, which goes far in support of the opinions and in corroboration of the views I advanced in the *Provincial Journal* for April 1842. . . . Dr. Holmes's paper . . . does not, I think, go far enough . . . whereas the disease, in my belief, is quite as frequently carried by the medical attendant to each fresh labour patient he is called upon to attend, from some original infectious case whether of gangrenous erysipelas, or typhus fever, or whatever animal poison besides, may hereafter be found to produce it.

The paper culminates in suggestions for "midwifery practitioners":

> I should also, after a postmortem of any kind, or after an operation upon any case of erysipelas, or of typhus, recommend the most careful ablutions of the hands, and for the surgeon to avoid attendance on a labour in any part of a dress in which such operations have been performed, not forgetting the gloves, as the hand and arm are the chief instruments of contact . . .

The importance of these observations is recognized by Thomas Watson (1848) in the third edition of his *Lectures on the Principles and Practice of Physics*. But for minor revisions, the section on puerperal sepsis is reprinted as originally published in the *London Medical Gazette*. However Watson has added one paragraph:

All this I have taught in these lectures from the first. Subsequently to their publication, additional evidence to the same purpose has been promulgated, in the *Fifth Annual Report of the Registrar-General* (Storrs, 1843): to which I refer, because the collector of that evidence (Mr. Storrs of Doncaster) points out a wider range of danger than I had indicated, and extends his sound admonitory counsel beyond the cases of puerperal peritonitis, or child-bed fever. He shows that the mischief does not always *originate* in the practice of midwifery. The infecting virus is liable to be carried, not only from one parturient to another, but from various other sources of animal poison; the circumstances of childbirth rendering the mother peculiarly susceptible of such contagion. More than one series of these fatal maladies have been traced back to the attendance of the accoucheur, at the same period, or just before, upon some case of erysipelas, of sloughing sores, of external gangrene, of typhoid fever, of even to his recent presence at the examination of some dead body. These are hazards which the practitioner in midwifery, especially in the country, cannot always avoid; but it is most important that he should be aware of them, and should strive to defeat the risk by the most scrupulous observance of every conceivable precaution.

Summary

Excerpts are quoted from publications by Thomas Watson and by Robert Storrs on puerperal sepsis, containing the fully developed concept of its aetiology and prevention, antedating the more widely known publications of Holmes and of Semmelweis by one year and by four years respectively.

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The literature used in preparing this paper is in the collection of the Army Medical Library, Washington, D.C., U.S.A.

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CHARLES CLAY: THE FATHER OF OVARIOTOMY IN ENGLAND*

BY

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To the young surgeon, trained in asepsis, operating in modern theatres with modern tables and equipment and with the useful aids of transfusion, antibiotic drugs, and modern anaesthesia, ovariotomy is one of the simplest of abdominal operations and almost devoid of mortality. In fact, so simple and safe is the operation that the modern gynaecologist rarely, if ever, sees the enormous tense cysts of my youth, to which appeared to be attached a thin, shrunken, cadaverous woman, something like the big drummer in a brass band. Now these cysts are removed when first recognized, before the woman shows general symptoms, and it is therefore difficult for the modern gynaecologist to realize the discomfort and weakness which induced these women to submit to operation without anaesthesia, and accept the risk then inevitable to the operation. Nor is it possible to understand the howl of execration which was raised when attempts were made to remove them.

To me and to my generation, who were trained without any of these aids, the task is easier, though, even to us, it is difficult to visualize the tense atmosphere of the operation room and to appreciate the steadiness of nerve and the unconquerable determination of both surgeon and patient, when an incision was made from ensiform to pubes without anaesthesia, to remove organs from a cavity never before seen in life by any of the audience and without knowledge of how they would react: with the acceptance by the patient that her chance of survival was about 50/50 and for the surgeon that a fatal issue would unleash a yelping chorus of vituperation, even if he were not arraigned for manslaughter.

Removal of large ovarian cysts and Caesarean section were the operations which first warranted the deliberate opening of the unwounded abdomen and the man who has the honour of first doing ovariotomy successfully, is Ephraim McDowell, of Kentucky, in 1809, and Jane Crawford was the brave patient.

Eventually, McDowell performed this operation 13 times, with 4 deaths, but so far as I can discover, Clay knew only of 3 of these operations.

McDowell was followed by a few other operators in U.S.A., and in 1824, Lizars, of Edinburgh, who had received McDowell's first communication, operated 4 times with somewhat disastrous results. True, only 1 of the 4 died, but of the 3 who recovered, 1 was discovered to have no tumour and was, in fact, a case of pseudocyesis and, in one of the others, the tumour was so adherent that it could not be removed.

More recently, Jeaffreson of Framlingham and King of Saxmundham had had

* Presidential Address to the Manchester Medical Society on 3rd October, 1951.

3 successful cases and 1 death, but they operated through a very small incision and removed the tumours piecemeal and blindly, whereas McDowell and Lizars had made a long incision so that the tumours could be inspected and adhesions dealt with by sight.

Such was the state of ovariotomy when, in 1842, Charles Clay of Manchester commenced his notable series and continued for 16 years "alone and unaided" to perform the operations and to publish his case records in the face of much abuse and charges of recklessness.

The first 14 cases were operated upon without anaesthesia and well over 100 before Lister's discovery of the cause of sepsis.

The term "ovariotomy" was coined by Sir James Y. Simpson for Clay's operation and he was generally regarded, the world over, as the father of ovariotomy in England. I think he did the first hysterectomy in England and certainly he did the first successful one in Europe, having extremely bad luck in that his second case died through an accident 13 days after the operation, which otherwise would have been the first successful hysterectomy in the world.

Charles Clay was born in Bredbury in 1801, apprenticed to Kinder Wood, in Manchester, spent 4 years in Edinburgh where he qualified as Member of the Royal College of Surgeons, settled in general practice in Ashton in 1823 and removed to 101 Piccadilly, Manchester, in 1839, became an extra Licentiate of the Royal College of Physicians of London in 1842, and in the same year commenced his great career as an ovariotomist.

The first patient upon whom Clay performed this operation was Mrs. Wheeler of 75 Heyrod Street, Ancoats, Manchester. She was 45 years of age, had had 8 children, and for 3 years had noticed an abdominal enlargement which had now reached the size of a full-time pregnancy. Until this time the only treatment for ovarian cysts had been tapping, the frequency increasing as time went on while the patient rapidly shrank into a wizened attenuated shadow of her former self, apparently attached as a mere appendage of the larger and more vigorous tumour, until death relieved her of her sufferings. More recently iodine had been injected into these cysts without any good result. Mrs. Wheeler had undergone these tappings and was apparently sufficiently intelligent to appreciate that her case must end fatally if the tumour was not removed and she was sufficiently strong minded to determine to give herself this one chance.

Between 10th June, 1842, when Clay first saw her, and September, when he operated, tapping and injection of iodine had been tried without success. "My Patient began to express herself earnestly desirous of an operation, respecting which I neither persuaded her to, nor dissuaded her from, but faithfully detailed to her the importance and magnitude of the means she sought—pointed out the particulars of every case on record, with the results, and rather, if anything, deprecated than added to the chances of recovery." The cases which Clay was then able to point out to her might well have appalled the most stouthearted. "Still she was determined I should operate, and the calm deliberate manner in which she weighed the matter, convinced me I had a woman of no ordinary nerve to deal with—and that, in itself, was a point of considerable promise towards ultimate success."

After further consultations with Dr. Radford and other colleagues, he decided to operate on 12th September, 1842.

"I now felt fully sensible of the deep responsibility I had undertaken in engaging to perform an operation that had no

precedent in this country, and but few elsewhere: an operation that yielded to none in its importance, and as to magnitude, greater than any other in the field of operative surgery. The difficulty of obtaining the countenance of my medical brethren, in a path untrodden before in this kingdom, came over me in full force; but the woman's earnest appeal for relief, and the consciousness that no other mode of effectual relief presented itself, that I had not sought it for the mere whim, determined me to meet the matter fairly and abide by the result: although I was perfectly aware that, if the case proved unfortunate, the world would not be wanting in arguments to condemn me for rashness, if not an unjustifiable attempt to render myself notorious. But professional men well know that the notoriety attending unfortunate results of operative surgery is far from being enviable; and more than counterbalances the good from successful attempts: hence the truth in the old adage 'a good report goes far, but a bad one much farther'."

It may have been "difficult to obtain the countenance of the general body of medical men," but Clay was fortunate in the small group who attended his earlier operations and stood by him. Dr. Radford, the consulting physician to St. Mary's Hospital, Messrs. Vaudray and Winterbottom and Kershaw, Surgeons to the same Hospital, and Mr. George Southam, afterwards Professor of Surgery in this University.

On this fateful day, these gentlemen met at Clay's house and no doubt consumed a glass of sherry while he detailed the main steps he meant to follow in the operation. The temperature of the room must be about 72°: he intended to make a long incision from ensiform to pubes and had marked the skin with lines of silver nitrate, to facilitate suturing: he intended to avoid opiates and stimulants after the operation. They then proceeded to Mrs. Wheeler's house, where they found her "cheerful and free from excitement, having prepared everything for the occasion that was thought necessary. The pulse stood at 70, soft and compressable." He records that he stood on the patient's right side and that his friend, Mr. Vaudray, assisted him.

With one stroke of the scalpel he severed the integuments from ensiform to pubes, finding these only the thickness of strong paper in the umbilical region. The peritoneum was incised, two fingers inserted to protect the viscera, and a bistuary introduced to complete the incision of the peritoneum.

Now was the dramatic moment and we can visualize this small group of medical men gazing with concentrated attention at this large incision.

"At this moment, none, but those who witnessed such a scene, could have any idea of the extent and formidable appearance of the operation—the incision from sternum to pubes over the bulky tumour could not be less than 24 inches, perhaps as large an incision as ever was made in a living subject; the parietes of the abdomen rapidly retiring laterally and the enormous tumour, as it were, springing forward, was sufficient to startle the coolest and most determined individual."

Leaving poor Mr. Vaudray to hold this large tumour, Clay secured the pedicle with a strong ligature of Indian hemp and severed it, leaving the ligature long enough to be drawn through the lower angle of the abdominal wound to act as a drain. He now found an omental adhesion, which, Mr. Vaudray still holding up the tumour, he separated and ligatured, and then, co-operating with Mr. Vaudray, their united strength was required to lift the tumour from the pelvis. The integument was closed by 9 stitches.

She was then lifted into bed, 45 minutes from the commencement of the operation, "cheerful and complaining only of a pain about the last lumbar vertebra and the right iliac fossa."

Fourteen hours later, an enema with castor oil was given and as it was not rejected this was repeated and the patient bled 8 ounces. On the 5th day, the dressing was changed: the wound looked well and had adhered except where the sutures came through. "The patient experienced little fatigue from the dressings and changing the bed and linen; it was with difficulty she was restrained from giving a helping hand." On the 21st day she returned to her ordinary duties.

The second case, Elizabeth Beswick, was tapped on 30th September, 1842, when 25½ pounds of fluid were removed. The bowels were opened with oxgall and on 7th October, in the presence of Dr. Radford, and Messrs. Vaudray, Southam, and Winterbottom, he removed the tumour through a somewhat smaller incision, only 2 inches above the umbilicus. This must have been an uncomplicated case, as the operation took only 10 minutes and she was back in bed in 25 minutes. "My patient was quite equal to the task she had undertaken: scarcely a word fell from her lips indicative of pain—on the contrary, she replied to any questions with great composure, and drew comparisons between the sufferings of parturient efforts and the operation—concluding that she had had worse labours and suffered more pain, than at the present operation."

Heroic Mrs. Wheeler and Mrs. Beswick must have done much to fortify Clay in his endeavours to cure these patients.

His third case was a failure and reading the description now I feel sure he was dealing with a hopelessly malignant growth. Only a small incision was made and nothing removed. The patient died on the 6th day, as she probably would have done if the incision had not been made.

The fourth case, Hannah Edge, came from further afield, New Mills. She had been tapped 4 times, and when Clay did so for the 5th time he removed 30 pounds of dark glairy fluid. Even then there was a large cyst which Radford thought to be a second cyst, so this was tapped and another 30 pounds of clearer fluid removed.

On 8th November, 1842, the sac and remaining tumour were removed, but so general were the adhesions and so much haemorrhage resulted from their separation that none expected her to recover. However, his luck held and she did.

In his 5th case he was not so lucky, for his diagnosis went astray as it did with so many of the early ovariotomists, and he found, on opening the abdomen, not an ovarian cyst but a uterine fibroid. The reporting of this case is very poor and it is impossible to determine whether he commenced the removal before he made the diagnosis, or whether, having determined that he was dealing with a uterine fibroid, he deliberately set about its removal.

This was accomplished by the simple expedient of putting a ligature round the pedicle, apparently including broad ligaments with the vagina, and we cannot be surprised that he had difficulty in securing the vessels or that the patient suffered from syncopy and died 1½ hours later. However, he considers this is "no argument against the operation of ovarian tumours, yet it offered an excellent caution against attempting the removal of tumours of a more solid formation."

There is no date to this operation, but as it was published in 1843 it almost certainly has priority to that of Heath of Manchester whose case in November 1843 is sometimes given as the first in England. His first publication in *The Medical Times*, Vol. VII, 1843, could show 5 abdominal sec-

tions with 3 recoveries after complete removal of the ovarian cysts, the 2 deaths being a malignant ovarian tumour and a uterine fibroid. In comparison with the previously published cases, we may consider this a brilliant beginning.

A year later, in *The Medical Times* of October 1844, he published "Ovariotomy. Another Case of extirpation of diseased ovary by the major operation." This was the first time this operation had been described as "Ovariotomy", and he explains in the opening paragraph that the name had been suggested to him by Sir James Y. Simpson.

These successes, as he had anticipated, raised a howl from those who feared to follow or were unable to repeat his success, and he was soon to realize that "a good report goes far, but a bad one much farther."

The most notable, and the one least to be expected, came from the general surgeon, Liston who, in other directions, had done so much to advance his branch of the profession and had himself suffered from professional jealousy and uninformed criticism.

In March 1845, *The Medical Times* published these remarks: "Ovariotomy. Mr. Liston says wounds of the abdomen are dangerous: patients perish from trifling openings where the viscera are not at all involved, and yet of late years the belly has been opened intentionally, with the view of ascertaining the existence of tumours, and of taking them out. These incisions have been made sometimes of limited extent and sometimes from the ensiform cartilage down to the pubes. Some people do not hesitate to make a hole in the abdomen, put in their fingers and feel what is there, strangely enough exemplifying what Hudibras says:

As if a man should be dissected
To see what part is disaffected.

These operations are, in Mr. Liston's opinion, exceedingly unjustifiable: he has always set his face against them and he thinks he always shall. In the first place, the diseases are not always—he would say very seldom—of a dangerous character." At the end comes the worst charge. "You are told how many patients recover where the disease is not of a malignant character, but many people write disingenuously; they do not tell the whole truth. Where they have an unsuccessful case they do not bring it forward, but every successful case they advertise most unblushingly. Out of 31 cases in which the operation has been perfomed by what is called the greater incision—16 died; in some of them there was no tumour and in some it was not removed." This diatribe was obviously directed against his old rival, Lizars, and the cases now published by Clay.

In the circumstances, Clay's reply on 15th March, 1845, shows great restraint, more than he showed in subsequent controversies: "Of all men in the world, you are the last from whom I should have expected such an exhibition of unfairness and prejudice, knowing, in your earlier career, how much you, yourself, suffered from the illiberality of others." He goes on to discuss the difficulty in diagnosis and asks pertinently whether Liston would condemn lithotomy because occasionally the surgeon failed to find a stone.

"Are we in the nineteenth century to have no improvements in surgery, but to stand still, do nothing? If so, why in the name of common sense did you publish your works in surgery, suggesting improvements on various patients?" One shrewd thrust, knowing the emnity between Liston and Lizars when the former was still in Edinburgh, he cannot resist, "You condemn an operation without having had any experience of it, because you had a rival in Northern Athens who practised it." He then indulges in prophecy which time has

proved true. "I venture to prophesy that when ovariotomy has been as long before the profession as lithotomy and operations for aneurysm, fewer mistakes will arise respecting the former operation, than at present characterize the two latter." Then he ends with a piece of moral advice and pious hope: "Do unto others as you would they should do unto you. That you may in future learn a lesson of forbearance and liberality and endeavour to earn the title of infallibility in cases of your *own* experience, is the sincere wish of one who is as ready to defend your good qualities as to expose your illiberality."

Liston had the good taste not to reply, and a toady who took up the cudgels on his behalf met with short shrift.

It is interesting to note that at a later date, when the general surgeon still feared to tread in the footsteps of Clay and his successors, they propounded the ingenious theory that the female peritoneum was more resistant than that of the male.

In 1848, Clay undertook the editorship of the *British Record of Obstetric Medicine and Surgery*. This is the first journal in the English language devoted to obstetrics and gynaecology. The amount of work he put into it is incredible. Not only did he obtain articles from leading men throughout the country, but he contributed papers, wrote annotations and reviews, and published extracts of current literature. The standard throughout was high and the pity is that there were not then sufficient men devoted to this specialty to make the venture a commercial success, and only two volumes appeared. It is interesting to note that the present flourishing *Journal of Obstetrics and Gynaecology of the British Empire* owes its foundation, in 1902, in a large measure, to Sir William Sinclair, then Professor of Obstetrics and Gynaecology in this University. In his journal, Clay published a long article extending through many numbers in which he gave details of 32 ovariotomies of which 22 recovered and 10 died. The first 15 are given in great detail with 4-hourly notes of the convalescence: from the 16th to the 24th the notes are shorter, and after this, scrappy.

His style is poor, his facts confused and some of the cases are not even in chronological order. In another paper he states that he operated upon the first 14 without anaesthesia. In this series it is No. 23 which is recorded as the first under chloroform and, if his dates are correct, I estimate that he did 122 without anaesthesia.

The defects were no doubt due to hasty writing, while doing so much work in editing his journal, but in those days, where scholarship was high, I can well understand why these results did not receive the attention they deserved. From now onwards he bowed to the patients' desires and used chloroform, but apparently not with complete satisfaction, as he wrote in 1863: "If it could be accomplished, I should infinitely prefer to operate without it, as the patient would bring to bear on her case a nerve and determination to meet so great a trial, which would assist beyond all value the after treatment; it would also relieve the case from that most distressing retching and vomiting, so common after all abdominal operations where it is used to the extent that it is required in ovariotomy."

Three of these cases are of particular interest (9, 10, and 14) as the tumours were found to be so adherent that they could not be removed. Other surgeons, faced with the same problem, merely closed the abdomen and left the patient to her fate. Not so Charles Clay; his active mind sought alternative methods, and he inserted a dozen folds of white worsted with long ends brought out at the lower angle of the wound. This was the old-fashioned "seton", which continued to discharge for 4 months, after which in none of the cases could a tumour

be discovered nor did any return. No doubt this continuous drainage depleted the patients, but they weathered the storm, thanks to mutton chops, broiled steaks, porter to drink with an occasional glass of old port. The second of these patients cured by this "ulcerative process" had come from the U.S.A., and eventually returned quite cured.

In 1856 he published his *Complete Handbook of Obstetric Surgery* in which he records that he has operated upon 71 cases with 22 deaths and 49 recoveries.

In 1860, John Clay of Birmingham published his translation of *Kiwisch on the Diseases of the Ovaries* to which he appended tabulated details of every known case of ovariotomy, 537 altogether, of which 395 were complete. Of 395 which were completed, 212 recovered and 183 died, a mortality of 46 per cent. To this series Charles Clay had contributed 93, of which 64 recovered and 29 died, a mortality of 31 per cent. This was much the longest series by any one operator and he had by far the lowest mortality.

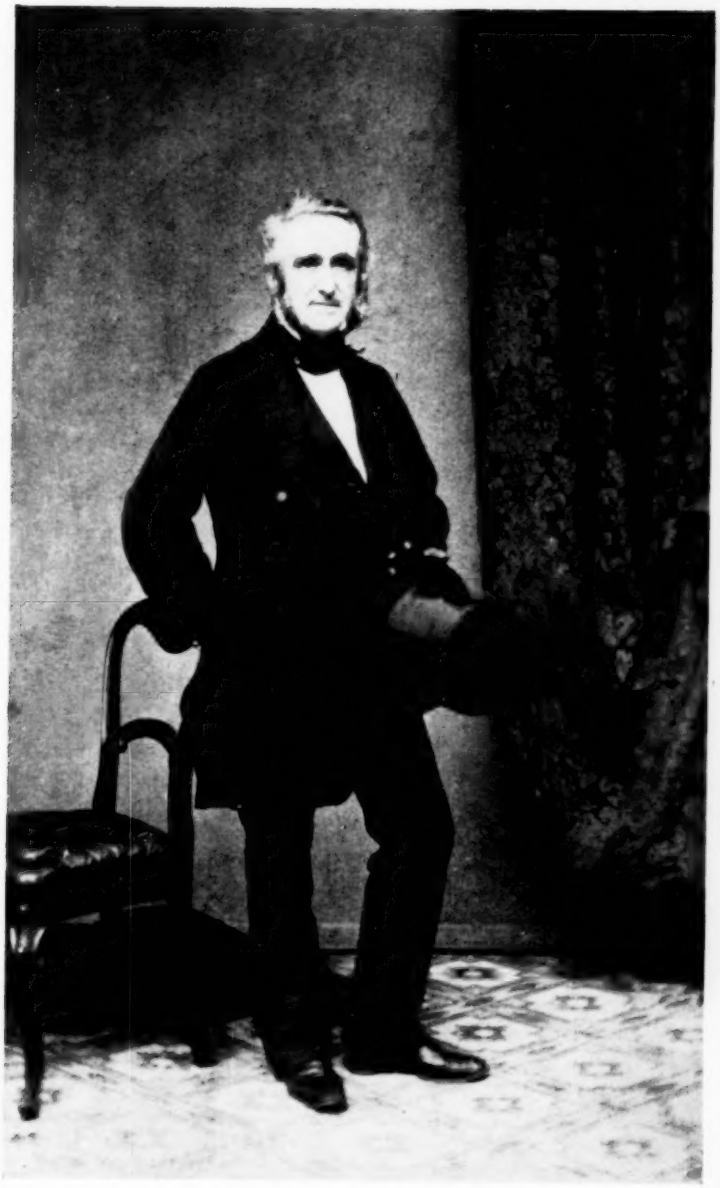
It should be noted that only at this stage, in 1858, did Spencer Wells commence his notable career as an ovariotomist.

In March 1863, before the Obstetrical Society of London, Clay read his important paper "Observations on ovariotomy, statistical and practical: also a successful case of entire removal of the uterus and its appendages." In this he reported 116 cases of peritoneal section of which 108 were ovariotomies and of these 74 recovered while 34 died, a mortality of 31.5 per cent. This paper was even more important as it recorded the first successful case of hysterectomy in Europe. It is necessary to stress this point as some books of reference give priority to Koeberle of Strasbourg, who performed his operation on 2nd April, 1863. Charles Clay did his successful hysterectomy on 3rd January, 1863, and described it before the Obstetrical Society of London on 3rd March, 1863, so he has clear priority.

Clay indeed had very bad luck not to have been able to make this claim 19 years earlier, when his would have been the first in the world. You will remember his first case in 1843 died of haemorrhage.

In January 1844, Clay encountered his second uterine fibroid, again I think unexpectedly, but this time he performed the hysterectomy deliberately, removing a fibroid weighing 20 pounds. In this case also the vagina was ligatured, again a panhysterectomy, and the patient progressed well until the 13th day. Then, when Clay was congratulating himself that all was well, the nurse, in changing the bed linen, although assisted by another woman, allowed the patient to fall on to the floor: inflammation was set up, probably from some encysted infection, perhaps from the ligatures, which had not yet come away, and the patient died two days later. This was a bitter blow.

His third attempt at hysterectomy came only 19 years later on 3rd January, 1863. By this time surgical conditions had greatly changed. Anaesthesia was regularly employed and Lister had promulgated the theory of sepsis and the early methods of combating it, though I cannot find any reference to it in Clay's writings. Above all, he profited by his sad experience in the two previous cases, and in this one, deliberately undertaken to remove a uterine fibroid, he determined to cut through the cervix and not to open the vagina. This case is well authenticated by three doctors from Preston, Sheffield and Manchester and, immediately after the operation, Professor J. Y. Simpson of Edinburgh arrived unexpectedly. He was greatly interested in the case and took the specimen back to Edinburgh, whence some time later, he returned a description and a sketch and ended his letter



DR. CHARLES CLAY

with, "your case may turn out as a precedent for operative interference in some exceptional cases of large fibroids of the uterus and I congratulate you most sincerely on the happy recovery of your patient."

In 1865 Clay published what I think is his last paper on "Ovariotomy and Ovariotomists" in the *Lancet* on 25th February, in which he could now claim 111 cases with 77 recoveries and 34 deaths, mortality 30.6 per cent. Unfortunately, he took this opportunity to criticize Spencer Wells who, centred in London and with a gift for advertisement, now claimed to be the originator of ovariotomy or at least to have re-established it. No doubt these men met at the Obstetrical Society of London, and I think Spencer Wells did come to Manchester to see Clay operate, but I imagine there was, from the first, mutual antagonism. Reading now Spencer Wells's introductory remarks in his book, I must confess my sympathy to be with Charles Clay, though I regret that Clay, in his righteous indignation, allowed himself to make remarks which called for censure.

Spencer Wells, 17 years younger than Clay, spent the first six years after qualification as a surgeon in the Royal Navy, and in 1853, at the age of 35, settled in London. The following year, on the strength of some postgraduate study in Paris, he was elected to the staff of the Samaritan Hospital where he assisted Baker Brown in his 8th ovariotomy, which ended fatally. In 1857 he did his first ovariotomy, which ended fatally, and his second in 1858, which recovered, and 6 years later, 1864, published his book, *Diseases of the Ovaries*, in which he writes with the calm assurance of one who has discovered the operation of ovariotomy or, at least, refounded it on modern lines.

He recalls with great complacency the fact that the operation is now being performed in the Colonies, Russia and France: by the Attlees and Peaslee in U.S.A. and by Keith in Edinburgh and Grimesdale in Liverpool, all apparently dating from "only seven years ago, when 1857 was at its close and 1858 at its dawn." What wonderful self-complacency to suggest that these world successes were due to his leadership in 1858 when we remember that Attlee had been operating since 1843 and Clay since 1842, 15 and 16 years respectively before this wonderful dawn. Clay is not mentioned until the third page when he is brushed lightly aside with: "Dr. Clay had steadily continued his career which he began in 1842, but his operations, not being performed in hospital before numerous professional witnesses, and no connected series of his cases being published, his work had but little influence."

Clay, as I have shown, steadily recorded his cases and only in the previous year, 1863, had read a paper before the Obstetrical Society of London (when he states Spencer Wells was present) in which he recorded 108 ovariotomies, with 74 recoveries and 34 deaths, a mortality of 31.5 per cent.

It is true these operations were performed in private practice, but in the earlier ones he is careful to record the names of the doctors, all men of standing, who were present.

Let me remind you that Clay had established this operation 16 years before Spencer Wells began, in the pre-anaesthetic as well as pre-antiseptic days, at the period when the few cases recorded in this country were so disastrous that any surgeon again making the attempt was certain to meet strong opposition from the profession. Over all these difficulties he had conquered: in the circles which most mattered he was the recognized father of ovariotomy, a name coined for his operation by the great Sir James Y. Simpson; and now this self-satisfied thrusting upstart, as he must have

appeared to Clay, who had visited Manchester to see Clay operate, brushed him aside as of no importance. No wonder Clay bristled with indignation and entered the fray with his sleeves rolled up, determined to show no mercy.

He begins his article ominously by suggesting that it may not be deemed presumption now, when this operation is recognized, if he "occupying the position I now do as the ovariotomist who bore the brunt and contumely of all that was levelled against the operation for many years *unsupported and alone*, came forward and examined the question fairly and honestly in reference to some modern points of practice." He smacks his lips at the opportunity to compare the results of Spencer Wells's cases by the short incision with his own 122 by the long incision. But first he questions some of Wells's cases. Five are recorded as cures which died so soon after operation that he cannot accept them, but to be quite fair, he proposes to count them neither as cures nor as failures.

Again, 2 fatalities are excluded as being other than ovarian cysts, but Clay will not accept this "as they are both as purely ovarian extirpations as any in the Volume."

Another fatal case was operated upon for a second ovarian cyst some years after the successful removal of the first and is described by Spencer Wells as unique. Clay points out that 2 years earlier, at the meeting of the Obstetrical Society at which Spencer Wells was present, he had described a case in which he had removed an ovarian cyst weighing 48 pounds, who, when living in the U.S.A., 16 years later, developed a second cyst and, on Clay's advice, rather than travel all the way to Manchester, had this removed by Attlee in Philadelphia. This patient recovered and, as Clay maliciously points out, the only thing unique about the case of Spencer Wells is that his died.

He then deals faithfully with Spencer Wells's strictures on himself, ending with "as to my operation having but little influence, I sincerely believe that if I had not been the pioneer of this operation in 1842, and for years after this, alone and unsupported, neither ovariotomy as an operation, nor Mr. Wells as an ovariotomist, would most probably be heard of at this time." After a long comparison of cases and figures, he produces this table of comparative mortality:

Dr. Taylor Smith	1	death	in every	4	cases.
Dr. Clay	1	,,	,,	$3\frac{1}{4}$	cases.
Mr. Baker Brown	1	,,	,,	$2\frac{1}{2}$	cases.
Mr. Spencer Wells	1	,,	,,	$2\frac{1}{3}$	cases.

Amongst the cases detailed is one fatality in which Spencer Wells states that Clay had tapped the cyst and infers that this contributed to the end result. Clay states that he had refused to operate upon this case as it was undoubtedly a malignant one and that Spencer Wells knew his opinion but deliberately operated and the patient died a few hours later. From the acrimonious correspondence it is impossible to say which was right. Possibly Wells did know of Clay's opinion and operated in the hope that he would score off him, while Clay, no doubt, was piqued that Wells was called in when he had pronounced the case to be inoperable. Unfortunately, he allowed his temper to get the better of him and wrote: "I was earnestly pressed to operate, but, though a splendid fee would have resulted, I persevered in my refusal and the *fee went into Mr. Wells' pocket.*" This went too far: the editor of the *Lancet* repudiated any responsibility for statements made by authors, deprecated personal allusions and stopped publication of further portions of these articles.

A month later, Spencer Wells replied. He refused to accept Dr. Taylor Smith's figures as he had only 25 cases. He then twisted

the figures round, added a further 6 successful cases though even then he could claim a mortality of only 32 per cent as against Clay's 30 per cent. A somewhat shameful admission when we remember that Clay's figures include all his early pre-anaesthetic pioneer cases. Finally, Wells brought an action for libel against Clay. This was sent to the arbitration of Dr. Robert Barnes and Sir William Jenner, with Sir James Paget as umpire, all London men, chosen, Clay says later, by Spencer Wells. However that may be, they only found that Clay's remarks "exceeded the bounds of fair criticism" on one count and ordered Clay to sign and publish a letter of apology for stating that Spencer Wells deliberately suppressed Clay's opinion about the malignant case and was actuated by the prospect of a big fee.

It is a great pity that Clay allowed his feelings of resentment to overstep the line, as without this insinuation he had sufficient facts to prick this bubble of conceit and self-satisfaction and to have made Spencer Wells look very small. But, if I read Clay's character aright, he was a forthright man, whose temper was easily roused at what appeared an indignity or injustice and he refused to cover his natural feelings with a veneer of good breeding which his Lancashire character would consider to be dishonest.

The result of this case I fear rankled in his mind as I cannot discover that he ever again published any records of his cases. Spencer Wells, however, was not to escape completely.

In his book he had inferred that he initiated the method of closing the abdomen by including the peritoneum and that he had gained this knowledge by experiments on animals. George R. Jesse, Honorary Secretary of the Society for the Total Abolition of Vivisection, challenged this and eventually brought out a pamphlet of 40 pages in which he gave the history of ovariotomy, emphasizing especially the work of McDowell and Clay and pointing out that the latter always included the peritoneum and did this without animal experimentation.

Twenty years later this pamphlet fell into the hands of Lawson Tait, until then a firm believer in Spencer Wells, to whom he had dedicated the first edition of his book *Diseases of the Ovaries*, in 1877. In an article in the *B.M.J.* in 1886, he rends Spencer Wells, and in a reply to an anonymous letter by "Historicus", who points to the fulsome dedication of 1877, Lawson Tait states that this dedication, fulsome though it may be, was actually written by Spencer Wells himself. Moreover, since then he had seen Jesse's pamphlet, had delved into the history of ovariotomy, now knew what ovariotomy owed to Charles Clay and that, far from discovering or reviving the operation, Spencer Wells had retarded it and "that it would have been better for humanity if Sir Spencer Wells had continued his service in Her Majesty's Navy and had never touched abdominal surgery."

Such then is the short history of the man who, in this country, nay in Europe, was the first to open the abdomen frequently and successfully, and his name should, therefore, be revered equally by the general abdominal surgeon and by the gynaecologist.

In his most active period he was acknowledged generally as the father of ovariotomy in Europe and well he deserved the title.

Later he was overshadowed by Spencer Wells, a man 20 years younger than himself, who had reached maturity when Clay was probably feeling the effect of age. Moreover, Spencer Wells was in London where, naturally, he had a wide audience,

and he had the self-confidence to make full use of this. What tells badly against the character of Spencer Wells is the way he tried to trample on Clay and ignore his work. That this rankled with Clay all through the remainder of his life, there can be no doubt. After the libel action, Clay ceased to write on ovariotomy and whether he continued to operate we have, so far, found no record, but he probably did as he remained in practice for another 20 years. When 92 years of age he gave an interview which was worked up into two autobiographical articles. Many of the statements are distorted and his figures cannot be confirmed, but there is no doubt that he bore a bitter emnity to Spencer Wells to the end.

Why do some men live in history while others as deserving die? This I think depends not so much upon the work and the writings of the man himself as upon his successors, and the urge to fulfil this duty varies in different schools.

It is rarely that a notable advance is not rediscovered some years later and generally the name of the rediscoverer is the one preserved.

Charles Clay was overshadowed by the younger Spencer Wells, who commenced 16 years later, when the operation was becoming generally recognized the world over, and for long Charles Clay's name has been found only in the histories of medicine.

I hope this address may do for him what those of Cullingworth and Adami did for Charles White, and remind the present generation of what they owe to the imagination, the ability and, above all, to the strength of character of a predecessor of which this School can justly be proud.

PREGNANCY AND VOLVULUS OF THE ILEO-PELVIC COLON

BY

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THE patient was under the ante-natal care of the Hospital (West Middlesex) in 1939 and referred to me for an opinion after her premature admission, the provisional diagnosis being concealed accidental haemorrhage.

The following notes are a combination of the house surgeon's and my own:

Mrs. F., aged 31, was expecting a baby in about a month, but was admitted on Saturday, 27th November, 1939, i.e., a month early, because of pain in the midlumbar region of the back. There was black vomiting today (Monday). Two enemas were given last night (Sunday) at 1-hour interval without result, but a little flatus was said to have passed. On admission her pulse was 100.

The abdomen was considerably distended. Gurglings were heard with a stethoscope and there was dullness in the flank.

Her general condition was fairly good on admission.

I saw her on Monday afternoon when I discerned some visible peristalsis just below the level of the umbilicus, and it appeared to be travelling towards the left iliac fossa. There was nothing important discovered per rectum.

The pulse was now round about 140. A diagnosis of torsion of the pelvic colon was made and operation carried out within an hour.

Operation

A spinal anaesthetic was given and a flatus tube was passed in the theatre. The abdomen was opened by a right paramedian incision, one-third above and two-thirds below the umbilicus. The large gut was greatly distended. As it was impossible to deal with this distended gut, it was deflated by a fairly large bore needle passed through a taenia. The puncture was closed by two purse-string sutures. It was now confirmed that the obstruction was due to a twist of the ileo-pelvic colon, a clockwise twist of two complete turns. There was free fluid in the peritoneal cavity. The gut was congested but not gangrenous. It was still moderately distended from loss of tone. Flatus was heard passing through the rectal tube on squeezing the bowel, but we were not sure from feel alone if the twist had been completely undone. If the twisting were not completely reduced then we would be risking the life of the mother and the fate of the baby. The thought of "the bird in hand" also arose, and in spite of the state of the mother a classical Caesarean operation was quickly performed. With the uterus out of the abdomen it was now seen that the gut had actually been untwisted, and the abdomen was closed in the usual way with interrupted catgut sutures for the rectus sheath.

Progress Notes

29th November. The abdomen is soft. The patient has no pain. 7th December. The patient complains of pain in the right shoulder, which radiates down the back. This is probably fibrositis. There is no evidence of embolism. 8th December. There is no abnormal sign in the chest, except that the base on the right side behind may be a shade dull. ? some minute infarct. 9th Demember. The respiration rate is 28. The patient still complains of pain on respiration over the angle of the right scapula. This area is a shade dull to percussion, but there are no adventitious sounds. ? infarct. There is very little liver dullness. ? ? subphrenic. 14th December. The patient seems very well. 19th December. A postnatal examination was carried out. Her general condition is good. There is still

not sufficient milk, but the child is taking well and the supply is increasing. The abdomen scar has healed well. 26th December. An examination per vagina is satisfactory. The scar is well healed and the patient is discharged from the Postnatal Department.

The Diagnosis

This was helped by the following considerations:

(1) Why should a patient with concealed haemorrhage repeatedly vomit?

(2) It was the slow regurgitant blackish vomit, which accompanies large bowel obstruction, rather than the more projectile "urgent" type of vomit of small bowel obstruction. The onset of the vomiting was slow.

(3) It is doubtful if you would get such distension in the case of small bowel obstruction.

(4) Abdominal rigidity was not a feature, nor was pain.

(5) This patient's general pain was in the back, apart from abdominal discomfort. Is this a usual feature?

(6) If such gross abdominal distension had been due to concealed accidental haemorrhage, the patient would have been moribund or dead by the time one saw her.

(7) The abdominal distension was not produced by a hard mass such as a blood-filled uterus would give you. The abdomen was tympanic over the still palpable (with difficulty) 36-weeks uterus.

(8) There had been no bowel motion and no satisfactory response to an enema. There was visible peristalsis.

The *suggested causation* was a redundant colon with a long meso-colon in the first place. Then there was peristalsis and bowel movement, followed by an *in toto* circular movement of the ileo-pelvic colon (clockwise probably owing to the large bulk of the uterus inside it) and the inclination of the meso-colon towards the midline in this region.

The *major points of the case* at this time were:

(1) A correct diagnosis was against the suggestion of accidental haemorrhage.

(2) A 'just in time' laparotomy.

(3) The deflation of the gut was a first step.

(4) The confirmation of the complete untwisting of the pelvic colon. Caesarean section was, therefore, necessary.

(5) The survival of both mother and child from the interesting predicament.

(6) The practicability of a barium meal or enema was doubtful with the patient in such a state as she was in 2 days after her admission.

When once the possibility of the condition not being concealed accidental haemorrhage had been thought of, the correct diagnosis seemed reasonably obvious.

Most of the above notes were written long before the interesting information of subsequent happenings had come to hand.

Subsequent history.

Nine years after this patient's initial operation for volvulus and Caesarean section a follow-up letter was sent to her old address, and we were fortunate enough to contact her. An interesting extract from her letter was as follows:

I was admitted to Ashford County Hospital in October 1943, and operated on by Mr. Woodd-Walker for obstruction, followed 3 weeks later by another operation when a section of the intestine was removed. I have had 3 more babies since 1939 (normal births), although the first of the 3 had the same complications at the eighth month which was righted with treatment.

The following is the summary of the notes made at Ashford County Hospital in 1943:

The patient was admitted on 31st October, 1943, with volvulus. Her past history revealed that 4 years previously the patient had been operated on when 36 weeks pregnant for volvulus at the West Middlesex Hospital (1939). Eighteen months ago, when 38 weeks pregnant, the patient had similar attacks of pain. These subsided on conservative treatment and labour was normal.

Recently the patient has been having colicky abdominal pain which is becoming worse and is accompanied by nausea but no vomiting. The bowels were not open for 5 days. On examination the abdomen was soft and distended. There was visible peristalsis and a mass of intestines was palpable to the left of the umbilicus, but silent on auscultation.

On 31st October, 1943, Mr. Woodd-Walker performed a laparotomy. A left paramedian incision was made and a large mass of greatly distended loops of intestine was delivered on to the abdominal wall. The distended loops were found to be kinked. The loop was untwisted and flatus was passed per rectum. The abdomen was closed. On 17th November, 1943, Mr. Woodd-Walker did a resection of the loop of sigmoid colon and a side-to-side anastomosis after resection of the distended pelvic colon. The patient made a good recovery.

Ten months later, on 6th October, 1944, she was re-admitted to Ashford County Hospital for a barium enema and the report was as follows:

Foetus present. Mega-colon present, easily holding 7½ pints. There is redundancy of the colon and a loop is present in the proximal part of the descending colon and another large loop is formed by the transverse and ascending colon. The loop is mobile and sweeps across to the left side of the abdomen. The proximal part of the sigmoid is fixed and slightly deformed and relatively narrowed at one place but this does not cause any obstruction of the inflow of the enema solution. Evacuation is very poor.

The X-ray appearances have apparently changed by February 1949, when a barium enema was done at Westminster Hospital.

The enema ran in as far as the caecum without obstruction. The pelvic colon appears short but there is no delay at the site of the anastomosis. The splenic flexure is under the left side of the diaphragm.

The hepatic flexure is low in position and the ascending colon is directed downwards and the caecum is lower in position when empty than when full.

I have not thought it necessary to reproduce the X-rays with this article. These show that the caecum is lying under the right lobe of the liver and that there is a great redundancy, therefore, of colon in the usual situation of the transverse colon.

This redundant colon consists of ascending colon and what would be in normal circumstances transverse colon. As we have seen, there was originally redundancy of the descending and pelvic colon, which seemed particularly liable to twist (on two occasions in association with pregnancy). This part of the redundant colon was much shortened by the resection of 1943 by Mr. Woodd-Walker, and in the X-rays of 1949 it appears fairly straight and actually shorter than normal. The whole of the colon appears a little distended perhaps, but by no means a mega-colon as was suggested by the X-rays of 1944 after the resection.

This case is classical in its support of the fact that most cases of volvulus of the pelvic colon are associated with some malposition of the large gut in particular, with a caecum under the right lobe of the liver and considerable redundancy of the colon in the upper and left sides of the abdomen.

Summary

A case is described of volvulus of the ileo-pelvic colon occurring at the 36th week of a primigravida. Treatment was by laparotomy, deflation of the distended gut

by needling, untwisting of the twist, and a classical Caesarean section confirming that this had been completely carried out. Mother and child lived.

The patient had a similar but milder attack of pain in the second pregnancy. This was probably again due to a torsion, but recovered without operation. Eighteen months later a further attack (not associated with pregnancy) was relieved by operation and 3 weeks later a resection of the loop of sigmoid colon and side-to-side anastomosis were carried out.

The patient had 3 deliveries by the normal route after the original operation and Caesarean section.

X-rays showed the abnormal position of the caecum (in usual situation of hepatic flexure), and the redundancy of the subsequent colon.

I have to thank Mr. D. M. Stern for allowing me to have access to the hospital notes of the case, also Mr. Woodd-Walker for his kindness in letting me have X-rays and subsequent history of the case.

MATERNAL MORTALITY IN NEW SOUTH WALES

With Special Reference to Age and Parity

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IN a recent review of the maternal mortality in Scotland, McKinlay (1947) has commented on the worldwide lack of data on the effect of age and parity on the maternal mortality rates. He remarks, as also does Dublin (1936), that the chief sources of information on these factors still are those of Coghlan (1900) and Matthews Duncan (1871).

During a survey of the mortality experience in Australia over the last 40 years, one of us (H.O.L.) has noted the unsatisfactory nature of the Australian definition of parity used in *Demography*, the annual bulletin of the Australian Bureau of Census and Statistics, Canberra, for the parity of the mothers in the case of births is assessed on previous issue (live-born) whereas, in the case of the deaths, the present or current pregnancy is taken into account in determining parity. Thus a woman dying after the birth of her first live-born child will be entered as "no previous issue" in the birth statistics but as having an issue of one in the death statistics. It is obvious under these conditions that while populations at risk can be estimated the corresponding deaths cannot be given and so no rates can be calculated.

On the other hand, in the New South Wales Bureau of Statistics and Economics, whilst previous issue is used to assess the parity of the mothers at risk in the same way as in the Commonwealth statistics, it is also used in a comparable manner for the parity of women dying. Thus deaths can be related to the appropriate number of confinements (or maternities as measured by the live births). The rates by age can be given for primiparae, all multiparae and all confinements for the entire period from 1901 up to the present day. For the years 1901 to 1907 and the years since 1938, the experience of the multiparae can be broken down in complete detail by age and parity.

The Confinements or Maternities

The official statistics of New South Wales, *Vital Statistics* in the earlier years and the *Statistical Register* in the later, give the ages of mothers at their first confinement resulting in a live birth for each year since 1893. They do not consistently cover the births of later children by age of mother, however, except for the years 1901 to 1907 inclusive and the years since 1938.

In the years 1894 to 1900, the births are available by parity but not by age of the mother. Between 1908 and 1937, the ages of all mothers have been available, so that we have been able to determine the experience of all multiparae by subtraction

of the primiparae from all mothers by age, using in general New South Wales official published statistics but, for 1927 to 1938, unpublished material kindly put at our disposal by the Bureau of Census and Statistics, Canberra (Mr. S. R. Carver). From 1938 to the present time, the New South Wales *Statistical Register* has been used.

Certain special points should be noted:

(1) A maternity is any confinement resulting in at least one live-born child.

(2) A maternity resulting in 2 or more live-born children has been counted only once.

(3) Previous issue, used to determine parity, is that of the existing marriage and/or issue to the mother by the same father prior to marriage.

(4) Certain children recently legitimated under the Legitimation Act, 1902, were included in the statistics of births as first births to married women for the years 1907 to 1921. Appropriate corrections have been made here.

(5) Stillbirths have been excluded from consideration because it is only since 1st April, 1935, that they have been registered in New South Wales.

The Deaths from Puerperal Causes

The number of deaths due to the puerperal condition by age and parity have been available since 1893 in New South Wales. The term "puerperal condition" has always been used so as to include deaths from ectopic pregnancy, all forms of abortion, whether criminal or not, diseases and accidents of pregnancy, labour and the puerperium. So that coding and classification practice has been consistent in this respect throughout. Moreover, with the Fifth Revision (1938) of the *International List of Causes of Death*, these practices are now consistent with those elsewhere. For international comparisons prior to 1938 this point must always be borne in mind.

For the year 1921 the parity data are obviously incorrect, although the ages appear to have been correctly tabulated. A distribution of the deaths by parity has been made at each age in accord with the experience of neighbouring years, 1922 to 1925.

A Comparison of the Definitions of the Deaths and Maternities

The definitions relating to the deaths and maternities are consistent in the following respects:

(1) Parity is determined by previous issue, which does not include the products of the present pregnancy.

(2) Multiple births in previous issue are counted according to the number of live-born children.

(3) Illegitimate children by the same father are included. The definitions differ, however, in that the previous issue of a mother dying includes all her issue, whether of the present marriage or not. It is possible that this results in some slight inflation of the deaths in the higher parities, although we do not consider that it is of any great importance.

Neither ectopic pregnancies nor abortions are included in the maternities forming previous issue, nor are pregnancies resulting in a still-born child. This is a defect common to the statistics of practically every country.

In the following we shall use the term "primiparae" to include all mothers who have not previously given birth to a live-born child, and "multiparae" those who have borne at least one live-born child.

The Deaths of Married Women from Maternal Causes and the Legitimate Confinements in New South Wales

Table I gives the number of maternal deaths (married women) by age and parity by the groups of years that have been

[*Continued on page 952*

TABLE 1

NEW SOUTH WALES

Number of Maternal Deaths in New South Wales (including Criminal Abortion) by Age Group and Previous Issue

PARITY (Previous Issue)	PERIOD	AGE GROUP—YEARS								TOTAL ALL AGES
		Under 20	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 and over	Not Stated	
0	1894—1900	57	167	120	61	21	8	2	—	436
	1901—1907	56	144	139	62	33	9	—	—	443
	1908—1910	17	70	67	36	16	2	1	—	209
	1911—1920	76	217	242	143	76	21	2	—	777
	1921—1930	73	281	248	145	86	30	2	—	865
	1931—1937	45	128	161	88	53	14	3	—	492
	1938—1942	25	76	119	84	35	12	1	—	352
	1943—1948	20	88	73	65	35	18	2	—	301
1	1894—1900	7	65	61	40	18	3	—	—	194
	1901—1907	7	62	72	45	28	5	—	—	219
	1908—1910	3	28	31	27	12	—	1	—	102
	1911—1920	6	99	156	101	50	14	1	—	427
	1921—1930	13	92	122	102	76	16	1	—	422
	1931—1937	10	70	85	58	42	11	1	—	277
	1938—1942	4	26	58	37	26	7	2	—	160
	1943—1948	4	21	53	37	35	10	—	—	160
2	1894—1900	—	33	77	60	22	3	—	—	195
	1901—1907	—	20	83	52	32	6	—	—	193
	1908—1910	—	24	27	21	17	3	—	—	92
	1911—1920	1	59	144	101	68	15	1	—	389
	1921—1930	3	39	118	116	88	29	2	—	395
	1931—1937	2	38	63	67	46	22	1	—	239
	1938—1942	—	20	39	30	39	12	2	—	142
	1943—1948	1	10	21	32	26	5	—	—	95
3	1894—1900	—	4	63	53	32	5	1	—	158
	1901—1907	—	12	58	62	40	12	—	—	184
	1908—1910	—	6	26	29	19	3	1	—	84
	1911—1920	—	21	100	99	59	30	—	—	309
	1921—1930	—	23	75	90	89	28	2	—	307
	1931—1937	1	18	47	55	51	23	3	—	198
	1938—1942	—	6	20	30	30	12	—	—	98
	1943—1948	—	2	18	19	29	6	1	—	75

TABLE I (*Continued*)

PARITY (Previous Issue)	PERIOD	AGE GROUP—YEARS								TOTAL ALL AGES
		Under 20	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 and over	Not Stated	
4	1894—1900	—	2	31	81	42	8	1	—	165
	1901—1907	—	2	29	56	49	13	2	—	151
	1908—1910	—	—	19	28	23	8	1	—	79
	1911—1920	—	1	59	84	67	30	2	—	243
	1921—1930	—	1	45	75	66	26	5	—	218
	1931—1937	—	1	19	37	53	25	4	—	139
	1938—1942	—	3	13	28	13	6	1	—	64
	1943—1948	—	1	11	12	13	5	—	—	42
5	1894—1900	—	—	20	44	49	11	1	—	125
	1901—1907	—	—	15	43	41	15	2	—	116
	1908—1910	—	—	6	27	18	8	—	—	59
	1911—1920	—	1	35	48	50	31	2	—	167
	1921—1930	—	1	17	51	61	32	1	—	163
	1931—1937	—	1	19	33	31	21	—	—	105
	1938—1942	—	—	6	11	16	8	—	—	41
	1943—1948	—	—	6	8	11	7	—	—	32
6	1894—1900	—	—	10	34	56	16	—	—	116
	1901—1907	—	—	3	26	46	15	1	—	91
	1908—1910	—	—	4	7	21	7	—	—	39
	1911—1920	—	1	8	39	62	28	4	—	142
	1921—1930	—	—	5	30	60	25	3	—	123
	1931—1937	—	—	4	21	27	15	1	—	68
	1938—1942	—	—	3	9	13	6	1	—	32
	1943—1948	—	—	3	3	6	6	3	—	21
7	1894—1900	—	—	4	25	56	21	2	—	108
	1901—1907	—	—	1	10	37	19	5	—	72
	1908—1910	—	—	1	2	16	5	—	—	24
	1911—1920	—	—	3	24	46	26	3	—	102
	1921—1930	—	—	2	17	42	26	4	—	91
	1931—1937	—	—	2	10	21	11	1	—	45
	1938—1942	—	—	2	5	11	11	—	—	29
	1943—1948	—	—	2	1	6	6	—	—	15

TABLE I (*Continued*)

PARITY (Previous Issue)	PERIOD	AGE GROUP—YEARS								TOTAL ALL AGES
		Under 20	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 and over	Not Stated	
8 or more including not stated	1894—1900	—	—	1	30	84	101	14	—	230
	1901—1907	—	—	1	18	77	89	21	—	206
	1908—1910	—	—	—	3	17	23	9	—	52
	1911—1920	—	—	1	9	56	63	11	—	140
	1921—1930	—	—	2	12	50	77	20	—	161
	1931—1937	—	—	2	8	46	35	12	—	103
	1938—1942	—	—	1	5	16	14	1	—	37
	1943—1948	—	—	—	2	12	11	—	—	25
Total Multiparae	1894—1900	7	104	267	367	359	168	19	—	1,291
	1901—1907	7	96	262	312	350	174	31	—	1,232
	1908—1910	3	58	114	144	143	57	12	—	531
	1911—1920	7	182	506	505	458	237	24	—	1,919
	1921—1930	16	156	386	493	532	259	38	—	1,880
	1931—1937	13	128	241	289	317	163	23	—	1,174
	1938—1942	4	55	142	155	164	76	7	—	603
	1943—1948	5	34	114	114	138	56	4	—	465
Total	1894—1900	64	271	387	428	380	176	21	—	1,727
	1901—1907	63	240	401	374	383	183	31	—	1,675
	1908—1910	20	128	181	180	159	59	13	—	740
	1911—1920	83	399	748	648	534	258	26	—	2,696
	1921—1930	89	437	634	638	618	289	40	—	2,745
	1931—1937	58	256	402	377	370	177	26	—	1,666
	1938—1942	29	131	261	239	199	88	8	—	955
	1943—1948	25	122	187	179	173	74	6	—	766

TABLE II

NEW SOUTH WALES

Number of Individual Mothers by Age Group and Previous Issue

PARITY (Previous Issue)	PERIOD	AGE GROUP—YEARS								TOTAL ALL AGES
		Under 20	20—24	25—29	30—34	35—39	40—44	45 and over	Not Stated	
0	1894—1900	6,934	23,037	13,106	4,208	1,452	318	28	—	49,083
	1901—1907	8,383	28,118	16,670	5,997	1,903	418	36	2	61,527
	1908—1910	4,164	14,344	8,759	3,144	1,072	249	23	2	31,757
	1911—1920	16,014	56,009	38,832	15,305	5,134	1,050	83	3	132,430
	1921—1930	22,648	60,923	40,717	17,251	6,464	1,453	93	2	149,551
	1931—1937	16,019	42,227	27,003	10,110	3,499	852	57	—	99,767
	1938—1942	10,952	37,878	29,279	10,927	3,243	662	37	—	92,978
	1943—1948	13,818	61,164	40,682	16,913	5,925	1,226	70	—	139,798
1	1894—1900	(a)	(a)	(a)	(a)	(a)	(a)	(a)	—	40,118
	1901—1907	1,755	18,611	17,580	7,853	2,337	440	28	3	48,607
	1938—1942	2,161	18,703	23,077	12,899	4,260	770	39	—	61,909
	1943—1948	2,168	27,630	39,535	23,885	8,506	1,408	56	—	103,188
2	1894—1900	(a)	(a)	(a)	(a)	(a)	(a)	(a)	—	33,627
	1901—1907	173	8,739	15,403	9,170	3,312	592	34	1	37,424
	1938—1942	249	6,849	12,078	9,069	4,228	963	43	—	33,479
	1943—1948	191	8,445	19,486	17,913	8,384	1,626	73	—	56,118
3	1894—1900	(a)	(a)	(a)	(a)	(a)	(a)	(a)	—	27,726
	1901—1907	7	2,751	11,080	9,467	4,269	866	52	1	28,493
	1938—1942	12	2,107	6,274	5,685	3,335	948	58	—	18,419
	1943—1948	9	2,303	8,268	9,504	6,062	1,517	81	—	27,744
4	1894—1900	(a)	(a)	(a)	(a)	(a)	(a)	(a)	—	22,975
	1901—1907	—	542	6,069	8,467	4,906	1,087	58	1	21,130
	1938—1942	2	525	3,148	3,782	2,554	894	66	—	10,971
	1943—1948	1	537	3,569	5,083	3,811	1,276	94	—	14,371
5	1894—1900	—	(a)	(a)	(a)	(a)	(a)	(a)	—	18,680
	1901—1907	—	99	2,695	6,732	5,229	1,445	85	1	16,286
	1938—1942	—	85	1,450	2,554	2,046	845	91	—	7,071
	1943—1948	—	110	1,522	3,011	2,594	973	86	—	8,296

(a) Not available.

TABLE II *(Continued)*

PARITY (Previous Issue)	PERIOD	AGE GROUP—YEARS							TOTAL ALL AGES
		Under 20	20—24	25—29	30—34	35—39	40—44	45 and over	Not Stated	
6	1894—1900	—	(a)	(a)	(a)	(a)	(a)	(a)	—	15,005
	1901—1907	—	15	909	4,524	5,027	1,737	132	—	12,344
	1938—1942	—	12	503	1,562	1,594	732	68	—	4,471
	1943—1948	—	15	623	1,691	1,855	748	65	—	4,997
7	1894—1900	—	(a)	(a)	(a)	(a)	(a)	(a)	—	11,688
	1901—1907	—	1	250	2,512	4,455	1,964	167	—	9,349
	1938—1942	—	2	181	834	1,201	653	59	—	2,930
	1943—1948	—	3	204	928	1,334	673	56	2	3,200
8 or more	1894—1900	—	(a)	(a)	(a)	(a)	(a)	(a)	—	22,262
	1901—1907	—	1	93	1,648	7,354	7,260	1,119	1	17,476
	1938—1942	—	1	75	656	1,773	1,649	271	—	4,425
	1943—1948	—	1	71	834	1,972	1,577	235	3	4,693
Total Multiparae	1894—1900	(a)	(a)	(a)	(a)	(a)	(a)	(a)	—	192,081
	1901—1907	1,935	30,759	54,079	50,373	36,889	15,391	1,675	8	191,109
	1908—1910	948	15,440	26,536	23,042	16,613	6,607	756	9	89,951
	1911—1920	3,900	58,577	107,269	94,466	61,782	23,015	2,263	77	351,349
	1921—1930	5,555	61,344	101,227	94,951	66,875	24,811	2,297	29	357,089
	1931—1937	3,711	40,180	58,542	49,347	33,833	13,318	1,304	—	200,235
	1938—1942	2,424	28,284	46,786	37,041	20,991	7,454	695	—	143,675
	1943—1948	2,369	39,044	73,278	62,849	34,518	9,798	746	5	222,607
Total	1894—1900	(a)	(a)	(a)	(a)	(a)	(a)	(a)	—	241,164
	1901—1907	10,318	58,877	70,749	56,370	38,792	15,809	1,711	10	252,636
	1908—1910	5,112	29,784	35,295	26,186	17,685	6,856	779	11	121,708
	1911—1920	19,914	114,586	146,101	109,771	66,916	24,065	2,346	80	483,779
	1921—1930	28,203	122,267	141,944	112,202	73,339	26,264	2,390	31	506,640
	1931—1937	19,730	82,407	85,545	59,457	37,332	14,170	1,361	—	300,002
	1938—1942	13,376	66,162	76,065	47,968	24,234	8,116	732	—	236,653
	1943—1948	16,187	100,208	113,960	79,762	40,443	11,024	816	5	362,405

(a) Not available.

chosen for study. They are inserted here since all the later computations depend on them.

In Table II are set out the corresponding numbers of confinements of married women by age and by previous issue, from the New South Wales official statistics or from information supplied to us by the Commonwealth Statistician.

A Comparison of Mortality of Primiparae and Multiparae

The mortality experience by age of the primiparae and of the multiparae (without further specification) are available from 1901 up to the present time, and the mortality rates for the primiparae by age can be obtained for the period 1894 to 1900 as well. These rates are displayed in Table III.

In the two earliest periods the mortality at ages under 20 years for primiparae was higher than at ages 20 to 24 years, but it seems that after 1908 there was little difference in the mortality rates of the two age groups. From this age onwards, however, the mortality rises rapidly with age. At ages above 40 years in 1894 to 1900 the mortality was very high, almost 3 per cent or 30 per thousand. But even in the more recent times the mortality at these older ages has been high, in the years 1943 to 1948 the mortality being 15 per thousand. There may be some doubt as to whether we can generalize from this experience of the very high rates at the end of the reproductive life to mean that a given group of women would have a certain mortality at each age if they were to have their first child then. There is probably a certain amount of selection by which the mothers bearing their first child at ages under 25 are the most efficient. The mortality of the multiparae in general is less than that of the primiparae at the same age. A notable exception to this rule occurs at ages under 20 years in 1943 to 1948. In a later section we show that this rise is due to abortions—in fact the rate depends on 5 maternal deaths all of which are due to abortion. It is of more interest to detail the maternal mortality by individual parity, which we propose to do in the next section.

Mortality by Parity and Age

From 1901 to 1907 and since 1938 both deaths from puerperal causes and confinements are available for married women by parity and age. We have divided the years since 1938 into two periods. The maternal mortality rates for these periods are detailed in Table IV. In addition, the births by age are available for New South Wales for all the intervening years but not by parity. It may be assumed that at every age parity of births would be much the same as the parity of legitimate births in Australia generally. Making this assumption, which we do not think introduces any important error, we have been able to compute the rates of Table V.

Examining Table IV, it is noted that at every age the mortality is highest at the birth of the first child and then falls to a minimum for the confinements with one or two previous issue. With previous issue greater than two it would appear that the mortality is largely independent of the parity, that is, it does not continue to rise with the higher parities. We shall see later that the effect of parity has been confused in previous discussions with an increase in mortality with age. The conclusions in connection with parity to be drawn from Table V are essentially the same as from Table IV.

The predominating effect of age in both these tables can be shown by fixing attention on a particular parity and noting the mortality at each age. It is found that there is a rather rapid increase with age in every case, with the possible exception that with

TABLE III

Maternal Mortality in New South Wales by Age

A Comparison of the Experience of Primiparae and Multiparae

Parity	Period	Maternal Mortality Rates* by Age-Groups (Years)						
		Under 20	20 to 24	25 to 29	30 to 34	35 to 40	40 and over	All Ages
Primiparae	1894 to 1900	8.22	7.25	9.16	14.50	14.46	28.90	8.88
	1901 to 1907	6.68	5.12	8.34	10.34	17.34	19.82	7.20
	1908 to 1910	4.08	4.88	7.65	11.45	14.93	11.90	6.58
	1911 to 1920	4.75	3.87	6.23	9.34	14.80	20.30	5.87
	1921 to 1930	3.22	4.61	6.09	8.41	13.30	20.70	5.78
	1931 to 1937	2.81	3.03	5.96	8.70	15.15	18.70	4.93
	1938 to 1942	2.28	2.01	4.06	7.69	10.79	18.60	3.79
	1943 to 1948	1.45	1.44	1.79	3.84	5.91	15.43	2.15
Multiparae	1894 to 1900	—	—	—	—	—	—	6.72
	1901 to 1907	3.62	3.12	4.84	6.63	9.49	12.01	6.45
	1908 to 1910	3.16	3.76	4.30	6.25	8.61	9.37	5.90
	1911 to 1920	1.79	3.11	4.72	5.35	7.41	10.33	5.46
	1921 to 1930	2.88	2.54	3.81	5.19	7.96	14.65	5.26
	1931 to 1937	3.50	3.19	4.12	5.86	9.37	12.72	5.86
	1938 to 1942	1.65	1.94	3.04	4.18	7.81	10.19	4.20
	1943 to 1948	2.11	0.87	1.56	1.81	4.00	5.69	2.09
All Mothers	1894 to 1900	—	—	—	—	—	—	7.16
	1901 to 1907	6.11	4.08	5.67	6.63	9.87	12.21	6.63
	1908 to 1910	3.91	4.30	5.13	6.87	8.99	9.43	6.08
	1911 to 1920	4.17	3.48	5.12	5.90	7.98	10.75	5.57
	1921 to 1930	3.16	3.57	4.47	5.69	8.43	11.48	5.42
	1931 to 1937	2.94	3.11	4.70	6.34	9.91	13.07	5.55
	1938 to 1942	2.17	1.98	3.43	4.98	8.21	10.85	4.04
	1943 to 1948	1.54	1.22	1.64	2.24	4.28	6.76	2.11

TABLE IV

Maternal Mortality in New South Wales by Age and Parity for three Periods of Time

Period	Previous Issue	Maternal Mortality Rates* in Age Groups (Years)						
		Under 20	20 to 24	25 to 29	30 to 34	35 to 39	40 and over	All Ages
1901 to 1907	0	8.22	7.25	9.16	14.50	14.46	28.90	8.88
	1	3.99	3.33	4.10	5.73	11.98	10.68	4.51
	2	—	2.29	5.39	5.67	9.66	9.58	5.16
	3, 4	—	4.25	5.07	6.58	9.70	13.09	6.75
	5, 6, 7	—	—	4.93	5.74	8.43	10.31	7.35
	8 or more	—	—	—	10.92	10.47	13.13	11.79
	All	6.11	4.08	5.67	6.63	9.87	12.21	6.63
1938 to 1942	0	2.28	2.01	4.06	7.69	10.79	18.60	3.79
	1	1.85	1.39	2.51	2.87	6.10	11.12	2.58
	2	—	2.92	3.23	3.31	9.22	13.92	4.24
	3, 4	—	3.42	3.50	6.13	7.30	9.66	5.51
	5, 6, 7	—	—	5.15	5.05	8.26	10.62	7.05
	8 or more	—	—	—	7.62	9.02	7.81	8.36
	All	2.17	1.98	3.43	4.98	8.21	10.85	4.04
1943 to 1948	0	1.45	1.44	1.79	3.84	5.91	15.43	2.15
	1	1.85	0.76	1.34	1.55	4.11	6.83	1.55
	2	—	1.18	1.08	1.79	3.10	2.94	1.69
	3, 4	—	1.05	2.45	2.13	4.25	4.04	2.78
	5, 6, 7	—	—	4.68	2.13	3.98	8.46	4.12
	8 or more	—	—	—	2.40	6.09	6.07	5.33
	All	1.54	1.22	1.64	2.24	4.28	6.76	2.11

* Deaths per thousand live births.

TABLE V

*Maternal Mortality in New South Wales by Age and Parity for three Decennia**

Period	Previous Issue	Maternal Mortality Rates † in Age Groups (Years)						
		Under 20	20 to 24	25 to 29	30 to 34	35 to 39	40 and over	All Ages
1911 to 1920	0	4.67	3.74	5.95	9.08	14.10	18.17	5.86
	1	—	2.85	4.01	5.14	7.46	10.84	4.12
	2	—	3.79	4.76	4.90	7.95	8.64	5.01
	3, 4	—	3.67	5.30	5.67	6.84	12.31	5.88
	5, 6, 7	—	—	7.50	5.71	7.70	10.87	7.17
	8 or more	—	—	—	—	7.63	9.00	7.42
	All Parities	4.17	3.48	5.12	5.90	7.98	10.75	5.57
1921 to 1930	0	3.15	4.39	5.66	7.86	12.39	19.07	5.65
	1	2.84	2.43	3.02	4.38	8.44	9.05	3.61
	2	—	2.65	4.26	5.32	8.30	12.49	5.00
	3, 4	—	4.39	4.78	5.44	7.72	10.05	5.88
	5, 6, 7	—	—	4.92	5.90	8.28	10.15	7.30
	8 or more	—	—	—	6.86	7.12	12.79	9.58
	All Parities	3.16	3.57	4.47	5.69	8.43	11.48	5.42
1931 to 1940	0	2.56	2.61	5.02	7.50	12.06	20.53	4.46
	1	2.67	2.51	3.05	3.67	7.83	9.94	3.43
	2	—	3.76	3.90	5.02	7.63	14.98	4.96
	3, 4	—	4.73	4.86	6.57	9.42	13.63	6.90
	5, 6, 7	—	—	7.82	7.49	8.76	10.57	8.25
	8 or more	—	—	—	—	14.49	12.12	12.27
	All Parities	2.64	2.81	4.33	5.88	9.43	12.68	5.11

* The divisors, used to obtain the rates in this table, were derived from Australian figures by assuming that at every age the distribution of parity in New South Wales was approximately the same as in all Australia.

† Deaths per thousand live births.

no previous issue or a previous issue of one the mortality is higher at ages under 20 than at ages 20 to 24 years. This effect with previous issue of one is probably due to abortions being high relative to the number of births at this age.

In 1901 to 1907, for each parity class, the mortality at ages over 40 years is 3 to 4 times as high as at ages 20 to 24 years. Since the higher parities tend to occur at higher ages it is easy to see how the mortality by parities, without an analysis by age, increases with the parity. The tables show that the effect usually attributed to parity can be explained by the influence of age. Moreover, in any age class the mothers of higher parity will in general be older than those of a lower parity, so that in the Tables the effect of age has not been entirely eliminated and so one would expect that if it were possible to do so the effect of increasing parities after the third birth would be quite negligible.

We have not put the standard errors of the rates in the Tables but have not given rates when the number of deaths was unduly low. However, the standard error can be computed easily in any given case by dividing the rate by the square root of the corresponding number of deaths. It is apparent that, even for the whole of an area such as the State of New South Wales, the number of cases is not as large as one would like. This has been compensated for to some extent by the comparison of groups of years, but it is desirable to have similar data on a Australian-wide basis. This is only possible if the previous issue for the maternal deaths is used instead of total issue.

The Causes of the Differential Maternal Mortality Rates (by Age and Parity)

At this time it is not possible to obtain a breakdown of the causes of death except for the years 1943 to 1948, the most recent period treated here. In Table VI the deaths by parity are classified by cause. Owing to the small numbers, it has been necessary to group the parities and the causes.

The mortality rate has been given per thousand confinements in parentheses alongside the number of deaths. The code numbers are those of the Fifth Revision of the *International List of Causes of Death*.

The Effect of Individual Causes on the Maternal Death Rate

In Table VII we have taken two age groups, 25 to 34 years and 35 years and over, for comparison. We have formed four parity classes as in Table VI. Comparisons may be made by cause between age groups and between parity groups. The causes may be discussed individually.

Abortion. No distinction has been made here between different forms of abortion. At no age is this factor important in the mortality of the primiparae. The statistics, of course, give a rather biased picture here, for only married women are being discussed. A single woman falling pregnant will not as a rule marry and then induce an abortion, nor will a married woman as a rule attempt to induce one in her first pregnancy, but if later pregnancies occur at too short an interval she may. The whole of the 5 deaths at ages under 20 years for mothers with a previous issue of one child in New South Wales in 1943 to 1948 were due to abortion. In Table VII it can be seen that in each age group the mortality from abortion increases with age. At confinements beyond the first, abortion accounts for some 30 per cent of the mortality.

TABLE VI

Maternal Deaths by Cause and Parity in New South Wales: 1943 to 1948*

Cause Code Number	Deaths by Previous Issue				
	0	1 or 2	3 or 4	5 or more	All Parities
140,141	17 (0.12)	65 (0.41)	39 (0.93)	29 (1.37)	150 (0.41)
142	17 (0.12)	23 (0.14)	5 (0.12)	0 (0.00)	45 (0.12)
143,146	34 (0.24)	35 (0.22)	17 (0.40)	23 (1.09)	109 (0.30)
144,148	123 (0.88)	56 (0.35)	23 (0.55)	17 (0.80)	219 (0.60)
145	5 (0.04)	3 (0.02)	1 (0.02)	2 (0.09)	11 (0.03)
147	63 (0.45)	43 (0.27)	19 (0.45)	11 (0.52)	136 (0.38)
149	34 (0.24)	21 (0.13)	11 (0.26)	8 (0.38)	74 (0.20)
150	8 (0.06)	9 (0.06)	2 (0.05)	3 (0.14)	22 (0.06)
All Causes:	301 (2.15)	255 (1.60)	117 (2.78)	93 (4.39)	766 (2.11)

* The figures in brackets are the deaths expressed as a rate per thousand confinements of the same "previous issue."

Abortion (140, 141) is seen to be an increasing cause of death with the higher parities. Ectopic gestation (142) is of relatively small importance at any parity but the mortality rate from this cause falls as the parity increases. Haemorrhages of pregnancy (143, 146) become of increasing importance with later pregnancies. Toxaemias (144, 148) in this Table are highest for the first and then again at confinements with previous issue 5 or more. Infections (147) have a somewhat similar effect. However, most of these causes are better studied in relation to age. Other diseases of pregnancy (145), other accidents of childbirth (149) and the miscellaneous group of causes (150) are of less importance.

TABLE VII

The Death Rates in New South Wales, 1943–8, by Parity and Cause for Two Age Groups

Cause Code Number	Age Group	Mortality Rate per Thousand Confinements of Women with Previous Issue			
		0	1 or 2	3 or 4	5 or more
140,141 (Abortions)	25 to 34	0.10	0.38	0.83	0.79
	35 & over	0.14	0.05	1.01	1.81
142 (Ectopic Gestation)	25 to 34	0.19	0.12	0.00	0.00
	35 & over	0.42	0.39	0.31	0.00
143,146 (Haemorrhages)	25 to 34	0.31	0.19	0.30	0.56
	35 & over	0.97	0.55	0.79	1.48
144,148 (Toxaemias)	25 to 34	0.94	0.30	0.49	0.56
	35 & over	2.49	0.85	0.78	1.07
147 (Infections)	25 to 34	0.54	0.23	0.34	0.68
	35 & over	1.94	0.85	0.79	0.41
Total:	25 to 34	2.40	1.42	2.27	2.81
	35 & over	7.62	3.79	4.21	5.59

Ectopic Gestation. This cause is more important in the earlier pregnancies. At a given parity the mortality is greater with age. This may be due to some selection, whereby women with an abnormality of the Fallopian tubes tend to be less fertile than those with normal tubes.

Haemorrhages. For both of the age groups in Table VII the mortality from haemorrhages is higher for the primiparae than for the women with previous issue from 1 to 4, possibly due to greater frequency of shock and delayed labour in first births. The rate rises, however, for the later confinements. This is probably associated with the increased frequency of placenta praevia at higher parities. There is a marked increase, with age, in the death rate from haemorrhage in any parity group.

Toxaemias. Similar conclusions can be drawn from the death rates from toxaemias as from the haemorrhages. It seems that these two factors are between them responsible for the characteristic dip in mortality for women with a previous issue of one or two at each age.

Infections. The death rates for infections are highest for the first birth and this is probably related to the greater need for instrumentation and other operative procedures because of delay and other difficulties in labour at the first birth.

The Work of Matthews Duncan (1871)

Matthews Duncan (1871) obtained the registered deaths and the deaths of all women in Glasgow and Edinburgh from the city registers. He was able to obtain the age and parity of these decedents. However, he was not able to obtain the ages of the corresponding mothers of live births. It is unnecessary to reproduce his results here since they are widely quoted and well known. His chief findings were that the mortality at the first birth was relatively high and that, after a relatively favourable experience for women with previous issue of one to five, the mortality appeared to rise as the number of previous issue increased further. It is unfortunate that he was not able to obtain age and parity for the births, as this work has tended to make later authors rather overstress the

effects of the high parity, whereas it would appear from the New South Wales figures that age is the predominant factor. He also gave a table showing the rapid increase in the mortality of the primiparae with age.

The Work of Coghlan in New South Wales (1898 and 1900)

Coghlan (1898), then the Government Statistician in the Colony of New South Wales, sent a paper to be read to the Royal Statistical Society in 1898. This was largely confirmatory of the results of Matthews Duncan but was founded on a very much larger experience. He republished his findings later (Coghlan 1900 and 1903), with further details. His chief findings were that at first confinement the rate of mortality had a minimum in the early twenties (age 23 years) and then rose again throughout life and that by parities the mortality was greater for the first than for the second and third births. After the third birth the mortality tended to rise again. Coghlan (1900) amplified his findings of 1898 but he still was unable to give a complete dissection of the deaths and births by age and parity. In 1903, however, he was able to do so, but it depends on unpublished data which cannot now be traced. We give his final results from page 63 of the 1903 publication as our Table VIII.

He concluded: " It will be seen that for both classes of women age is the great element in the risk. With multiparae, age brings in a further condition, viz., loss of vitality said to arise out of previous confinements, and it is interesting to determine whether the statistics give evidence of such condition. The following table gives the probability of death in child-birth for mothers of various ages, according to the number of previous issue [our Table VIII]. The importance of age, as an element of the risk, is apparent at each confinement, but the figures do not warrant the supposition that, apart from age, each successive confinement is attended with additional risk. The most that can be asserted is that for some women such is the case; on the other hand, there are a large number to whom the risk of dying is somewhat the same, whether their confinement be the second or the tenth."

Judging from the discussion on the 1898 paper there was little appreciation among some of the speakers as to the magnitude of the actual maternal mortality rates then existing in England. One speaker in the discussion, Dr. Hingston Fox, suggested that a higher mortality might be expected in a young community " whose population had not always been recruited under favourable conditions" and where the pop-

TABLE VIII

Coghlan's (1903) data on mortality by previous issue (years 1893—1900 in New South Wales)

Age Groups	Previous Issue								
	1	2	3	4	5	6	7	8	9
15—19	.0066	—	—	—	—	—	—	—	—
20—24	.0047	.0037	—	—	—	—	—	—	—
25—29	.0056	.0047	.0041	.0039	.0043	.0049	—	—	—
30—34	.0067	.0065	.0063	.0061	.0062	.0065	.0074	.0087	—
35—39	.0084	.0085	.0086	.0088	.0092	.0096	.0101	.0107	.0114
40—44	.0109	.0110	.0111	.0113	.0116	.0118	.0121	.0125	.0130
Ages 15—44	.0053	.0056	.0060	.0065	.0072	.0081	.0092	.0105	.0120

ulation did not have always ready access to the best medical care. However, the difference is more likely to have been due to under-notification of puerperal deaths in England. For it is unlikely that English maternal mortality rates had fallen much below those of the German ruling families and, in the latter half of the nineteenth century, maternal mortality in the German ruling families was still 14.7 per thousand deliveries (Peller, 1943). Moreover, the general mortality of the New South Wales population was shortly to fall much below the English rates, so that the population at risk could not have been very defective as was suggested in the discussion. In short, the mortality in New South Wales at this time was probably not exceptionally high for a European population. (The New South Wales official statistics do not, since 1933, include in their scope any full-blooded aboriginals, or nomadic half-castes, nor have the statistics ever been seriously distorted by inclusion of half-castes or aboriginals.)

This criticism of Coghlan's figures has continued until quite recent times. Thus Greenwood in a paragraph on page 9 of the report of Campbell (1924), under the section entitled "effect of the lowered birth rate," has doubts as to whether the New South Wales findings can be applied to European populations, since "*both* [Coghlan's and Duncan's] show an enormously high rate of mortality rates exceeding anything in the recent experience of any modern European statistics." It is difficult to understand this statement. The Registrar-General of England and Wales in his Table LXXXII of the Statistical Review for 1934, Text, gives the rates for England and Wales for the years 1891–95 as 5.49 per thousand live-born children. The figure corresponding in Coghlan's report (1900) is 6.92. Campbell (1924) in the chapter "International Comparisons" also draws attention to the wide disparity in the English and colonial rates existing at that time but she is, nevertheless, at pains to point out that some of the European countries with lower rates may not have enumerated all their maternal deaths. Tandy (1935) reports an investigation carried out by the United States Bureau of the Census in which certificates of women dying of causes associated with child bearing were sent to various statistical offices. She concluded that the practices made maternal mortality statistics comparable for Australia and the United States but would result in some 13 per cent less deaths coded to this group in England and Wales.

Possibly also "skilled medical care" had no great effect anywhere on the maternal mortality. This is suggested strongly by Peller's (1943) observation, already quoted. It is possible that the hospitalization would tend to cause an increase in the mortality from sepsis although skilled care might lessen the apparent mortality from other causes.

Slight changes in mortality are brought about by using a measure of confinements based on live- and still-births. This results in a slightly lower rate (by about 2 per cent) in those countries using this measure. For New South Wales we have used as the measure confinements resulting in a live birth.

The New South Wales findings are therefore in all probability relevant to English or European conditions, when some minor details of classification are taken into account. Obstetric practice in Australia has always taken its inspiration from Scottish and English example and little difference is likely from this cause. However, it differs in one respect—hospitalization for many years has been higher in Australia than in England and the midwife occupies a much less important position in Australian obstetrics than in the English.

SUMMARY

The practices in New South Wales as to the registration of legitimate births and of maternal deaths by age of married mother and by previous issue of married mother have been outlined. It is believed that where these figures are complete in New South Wales they are quite comparable as between different periods of time. In the years where the births in New South Wales are not classified by previous issue of mother, similar statistics are available for all of Australia and, by making the assumption that the distribution of parities by age is the same in New South Wales as in Australia generally, the mortality by age and parity of mother can be obtained for the whole of the period 1901 to 1948.

Using Coghlan's (1903) tables we have then a continuous record from 1893 to the present time. For 1943 to 1948 a classification by cause is practicable.

The conclusions drawn from these statistics are:

(1) For any group of calendar years the mortality of primiparae is almost without exception higher that that of the multiparae of the same age. The death rate for primiparae reaches a minimum usually in the age group 20 to 24 years of age and then rises continuously throughout life. For any given parity class of the multiparae, the mortality is higher in the higher age groups than in the lower. Exceptions occurring under the age of 25 years are due to the higher incidence of abortion associated with pregnancies other than the first. For any given age group, the mortality is highest initially for the birth of the first child, the mortality rate is least for the second birth and then rises slightly. This rise is not great but for parities with a previous issue of more than 7 children the rate is usually as high as the rate for primiparae or approaches this rate. The effects of age cannot be entirely eliminated from the parity comparisons since as a rule in any age group those with more children will tend to be older than those with less.

(2) When the deaths are analyzed by cause some of these gradients in the mortality rates can be explained by individual causes. Ectopic gestation is of importance in the first three pregnancies, it causes a higher mortality rate for the same parity class at the higher age. Haemorrhages cause a higher mortality at first births than at later. For the same parity, mortality is higher at the higher age. Toxaemias cause greater mortality at first than at subsequent births. Age again is of importance, the rates being higher at the higher age. Infections have a higher mortality rate at first births than subsequently. Increasing age is again of importance in increasing the mortality from infections. Abortions are important in increasing the mortality both with age and with parity.

(3) The New South Wales maternal mortality statistics are drawn from a population in which general health and medical practice are comparable with that of England and Wales, Scotland, and the European countries generally.

(4) The New South Wales statistics are probably unique in that the effects of age and parity can be studied together over a period of more than half a century.

(5) Some points in the international comparability of maternal mortality statistics are discussed, chief of which is that in New South Wales abortion deaths have always been referred to the puerperal mortality group of causes.

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MATERNAL MORTALITY IN THE DUBLIN HOSPITALS (1940-1950)

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THIS paper is a review of the chief causes of maternal mortality in the three Dublin maternity hospitals (Rotunda, Coombe and National Maternity) from January 1940 to January 1950. It is based on 300 deaths at all stages of pregnancy, labour and the puerperium. An additional 28 deaths occurred on the hospitals' domiciliary services and these will be referred to but are not included in the primary analysis, unless where specificially stated, because of incomplete data.

There were 92,224 deliveries in the hospitals during the decade. Of these 87,263 were more than 28 weeks pregnant and 28,917 were primigravidae. Somewhat more than 20 per cent were emergency admissions.

There were 36,250 district deliveries. Since it is the practice to admit all abnormal cases from the district to hospital these transferred cases will swell the hospital numbers. In general the patients who died at home died so suddenly or unexpectedly that removal to hospital was not possible.

The total number of deliveries under the care of the hospitals was therefore 128,474. The total number of deaths was 328.

During the same 10 years there were approximately 640,000 births and 1,700 maternal deaths registered in the Republic of Ireland. The maternal mortality rate fell from 4 per 1,000 to 1.8.

Such a fall of over 50 per cent in the mortality rate for a population must surely be accompanied by a considerable alteration in the relative importance of the various causes of death. As this paper is based on hospital practice it may not present an accurate picture of this change and yet, as 20 per cent of the total deliveries and deaths in the country took place in these hospitals, the figures will not be insignificant in this respect.

Because our paper is based on hospital practice the cause of death in each case is likely to be accurate to a considerable degree. Too often broad clinical headings are accepted as final diagnoses while they may be but predisposing factors to a fatal lesion.

For example, not all cases of accidental haemorrhage died and we will endeavour to show what was the real cause in those who did die. A clear appreciation of the real causes of death, so often masked by dramatic manifestations of a primary condition, might do much to avert resultant mortality.

It would be impossible to detail the cause of death in all the 300 hospital fatalities, but 192 (64 per cent) occurred as a direct result of the complications listed below. These conditions are the chief causes of maternal mortality in the Dublin hospitals and these only will be discussed. The first

figure represents the number of deaths in the hospital associated with, but not resulting from, each condition. Since no correction is made there is considerable overlap. A reference to the text is necessary for a clearer appreciation of the relative importance of these complications. The figures in parentheses represent the number of deaths on the district.

Eclampsia	42	(+1)
Non-convulsive toxaemias	15	(0)
Accidental haemorrhage	32	(0)
Placenta praevia	17	(0)
Ruptured uterus	20	(+1)
Postpartum haemorrhage	20	(+5)
Sepsis	38	(+4)
Rheumatic heart disease	33	(+2)

Eclampsia

There were 320 cases of eclampsia and 42 of them died—a 13 per cent mortality. The fact that Solomons reported a 10 per cent mortality from Dublin 30 years ago is a reminder of the complete lack of progress in the treatment of this condition since the conservative management was introduced.

Thirty-nine patients died from uncomplicated eclampsia. One of the other 3 died of infection a month later, the second had a concurrent haemorrhage and died 8 days later from uraemia, and the third had mitral stenosis and died in acute heart failure.

Because of the unsatisfactory treatment of eclampsia, prevention is of paramount importance. If ante-natal care is an efficient preventative it would appear possible, theoretically at least, to prevent fits in a woman who is admitted to hospital without them, since it is when she has developed the pre-eclampsia that preventative measures are needed.

Hence we will group our cases into those who had the first fit while in hospital under treatment, and those who were admitted to hospital after the first fit, irrespective of whether they were booked or not. Out of the total 320 eclamptics no less than 164 (51 per cent) had the first fit—actually developed the eclampsia—while in hospital. It must be appreciated that many of these patients were admitted in very late pre-eclampsia and had the first fit soon after admission. Nevertheless these figures make very serious reading.

Of the 164 who had the first fit in hospital 39 were cases of antenatal, 85 intranatal and 40 postnatal eclampsia. The effect of the pain and disturbance of labour is clearly illustrated here. The longest interval between delivery and the first fit in 56 postnatal eclamptics seen (40 developed in hospital and 16 admitted after delivery) was 32 hours, so the danger has passed after an interval such as this. The mortality in postnatal eclampsia was 7.2 per cent—exactly half the mortality in the other forms taken together.

Amongst the few known facts in this disease of theories are that pregnancy is the cause of pre-eclampsia and that pre-eclampsia once developed to the stage of albuminuria will rarely be cured except by removal of the cause. A consideration of the figures presented above would impress the opinion that when a woman is discovered to have pre-eclampsia the question that should generally arise is, not if she should be delivered, but how soon and by what method.

As more than half of the "hospital eclamptics" had the first fit in labour the method of delivery must be a very important factor in prevention. If a patient with pre-eclampsia is delivered by Caesarean section she cannot get either antenatal or intranatal eclampsia. In this series of cases 150 Caesarean sections were done for pre-eclampsia, generally advanced cases, and 2 developed postnatal fits. Both patients were amongst the very few who

had spinal anaesthesia and this may be significant. Fortuitously neither of them died. Two of these 150 patients did die—both from sepsis already developed before operation—and will be referred to in the commentary on pre-eclampsia.

Briefly, with regard to the prevention of eclampsia the position is—of 4,627 cases of toxaemia of late pregnancy admitted to the Dublin hospitals in the past decade 164 (3.5 per cent) developed eclampsia after admission.

If eclampsia is largely a preventable disease it seems reasonable to conclude that many of these patients were not delivered soon enough or were not delivered by the best method. If the judicious use of Caesarean section will prevent fits in the majority of cases then unquestionably the operation must play a big part in lowering the mortality from eclampsia.

The treatment of eclampsia in Dublin is along accepted conservative lines. Magnesium sulphate is the anticonvulsant in chief use. A comparison of the mortality now with that of 30 years ago hardly substantiates the claims of Stroganoff for this drug.

Of the 42 fatal cases, 37 died in the acute stage of fits. Cerebral haemorrhage accounted for the majority and cardiac failure for the rest. The longest interval between the last fit and death in these cases was 28 hours in a patient who remained in deep coma and died from cerebral haemorrhage. The only way to prevent these deaths is to prevent the fits, since patients with pre-eclampsia but very rarely get cerebral haemorrhage or cardiac failure, as a glance at our text will show.

A universally recognized fundamental in the prevention of fits is the elimination of stimuli. Since it is common regularly to take the blood-pressure, pulse, temperature and foetal heart and to test the urine frequently in eclamptic patients we were interested to know if in this series of cases these tests had any therapeutic or prognostic significance. Except in so far as they were signs of cardiac failure or cerebral haemorrhage we could not find that any of these tests had a bearing on the outcome. We must conclude that many, if not all, of these routine tests are positively dangerous because they are stimulants.

Only 5 of the 42 fatal cases survived the last fit by more than 28 hours. One of these died 4 weeks later from puerperal infection and another 10 days later from puerperal mania.

Two of the remaining 3 deaths were from uraemia and the third apparently was from liver damage. The role of the kidneys and the liver in eclampsia from the point of view of aetiology, prognosis and treatment makes these cases worthy of individual analysis.

One of the patients who died in uraemia was admitted to hospital 5 days after delivery. She had 2 fits during labour and none after. She was a primigravida, aged 29, and had a history of acute nephritis some years before. She had no antenatal care. On admission her blood-pressure was 180/105. Her urine was normal in amount and contained some albumin, red blood cells and fatty casts. Her blood urea was 300 mg. per cent, and she had gross oedema. Her ocular fundi were normal, but her heart was moderately enlarged. She died with uraemic convulsions 2 days after admission. Her blood-pressure then was 190/130 and her blood-urea 360 mg. A postmortem was done but by a mischance the kidneys were not sectioned. No conclusion as to the cause of the uraemia was arrived at from the postmortem examination. There are features in this case record strongly suggestive of chronic glomerulo-nephritis.

The other patient who died in uraemia

was admitted to hospital in labour with eclampsia and accidental haemorrhage of considerable severity. She was a primigravida, aged 37, and had no antenatal care. No previous history of any illness was obtained. She died 8 days after delivery and the last fit. She had oliguria for the first 4 days (1, 3, 6, 18 ounces), followed by a reasonably normal output. Her blood urea rose progressively to 300 mg. per cent. She did not have a postmortem. While the nature and cause of the renal failure in this case is obscure, a reference to our section on accidental haemorrhage suggests that the accidental haemorrhage may be more significant than the eclampsia although the absence of anuria may preclude the diagnosis at least of total bilateral cortical necrosis.

These are the only 2 cases where a renal lesion affected the outcome in eclampsia, out of 320 cases, including 42 deaths. It is not conclusive that the renal damage in either case was caused by the eclampsia.

The patient who apparently died from liver damage was admitted after 2 fits and no antenatal care. She had no further fits and the foetal heart ceased. All signs of toxaemia had disappeared when she was delivered with forceps under ether anaesthesia 4 days later. Soon after delivery jaundice appeared and deepened rapidly. She died 36 hours after delivery and 6 days after the last fit. She did not have a postmortem.

The importance of complete and accurate postmortem examinations in the elucidation of many clinical problems is well demonstrated by these cases, 2 of whom had no postmortem and 1 an incomplete one. The question of renal damage in the toxaemias of pregnancy will be raised again.

Meanwhile, to conclude this analysis on eclampsia, the biggest factor in maternal mortality in Dublin, we would suggest generally that while the management of pre-eclampsia is often too conservative the management of eclampsia is not conservative enough.

Non-convulsive Toxaemia of Late Pregnancy

Exclusive of the 164 patients who developed eclampsia in hospital there were 4,463 cases of toxaemia of late pregnancy. Approximately 4,000 had pre-eclampsia and the remainder had essential hypertension or chronic nephritis. It has not been possible to allocate them more accurately than this.

Two of the 4,463 cases developed fatal accidental haemorrhage. Both died of shock on the day of the haemorrhage. It is of considerable interest to note that only 2 of the 32 fatal accidental haemorrhages developed in hospital although virtually all of the 32 cases had signs of toxaemia when seen after the haemorrhage. These figures contrast strikingly with those in eclampsia where over half of the total were in hospital when they got the first fit. Why this discrepancy? It suggests to us that in the majority the signs of toxaemia are a result of the accidental haemorrhage and not the cause of it.

Apart from eclampsia and accidental haemorrhage 15 of 4,461 cases of toxaemia of late pregnancy died and these are the cases of main interest here. A list of the real cause of death in each case follows:

Intracranial haemorrhage	10
Hypertensive cardiac failure	1
Haemorrhage from the liver	1
Sepsis	2
Uraemia	1

Intracranial haemorrhage. Nine of these cases were known essential hypertensives. The tenth patient may have been a pre-eclamptic, or chronic vascular or renal disease.

Hypertensive cardiac failure. The 1 death was in a known case of essential hypertension.

Haemorrhage from the liver. This occurred in a mild case of pre-eclampsia who collapsed unexpectedly and died following delivery. At postmortem a massive extraperitoneal haemorrhage of the liver was found.

Sepsis. Both these patients were delivered by Caesarean section while already infected.

Uraemia. As we are particularly interested in the role of renal and hepatic failure as fatal lesions in the toxaemias of late pregnancy we append this patient's case notes. Unfortunately she did not have a postmortem.

She was aged 38 and para-9, and known to have have had hypertension and albuminuria on the only 4 previous pregnancies on which she had attended hospital. Two other babies had been stillborn at 30 weeks. She was admitted semi-comatose and blind, with blood-pressure 260/140, albumen solid and gross oedema. She had a twin pregnancy and was 35 weeks. There was no improvement in 3 days. Spontaneous delivery followed surgical induction. The blood-pressure returned to normal, the albumen to a trace and the oedema disappeared by the 6th puerperal day. There were red-blood cells, granular and hyaline casts in urine. Pyrexia began on the 7th day and increased to 105°F. on the 11th day, on which the patient died in a clinical state of uraemia. The blood urea on admission was 80 and on the day of death 200 mg.

In 4,463 cases of pre-eclampsia, essential hypertension and chronic nephritis this is the only patient who died in uraemia. This patient's history suggests a chronic lesion and the temperature further complicates the diagnosis.

Apart from eclampsia and accidental haemorrhage 15 patients with toxaemia of late pregnancy died. No less than 10 of these were known essential hypertensives. Three of the other 5 were known pre-eclamptics and 2 of these died from sepsis following Caesarean section. The other 2, who died from uraemia and cerebral haemorrhage, may have been cases of pre-eclampsia or chronic renal or vascular disease. It is clear that death from pre-eclampsia, not complicated by eclampsia or accidental haemorrhage, is a very rare occurrence. On this fact the importance of the prevention of eclampsia and accidental haemorrhage rests.

There is much confusion as to the importance of the kidney and liver in the clinical approach to the toxaemias of late pregnancy. It should be possible to dispel this confusion by the correlation of exact clinical details with accurate postmortem findings. It must be remembered that accidental haemorrhage is the cardinal factor in the production of renal damage in obstetrics and the lesion produced is a specific one. Accidental haemorrhage is a not infrequent concomitant of eclampsia and may pass relatively unnoticed because of the dramatic manifestations of the eclampsia, and its significance be overlooked if the patient dies later in uraemia. Patients with chronic renal disease of almost any nature may present the typical signs of pre-eclampsia and are likely to develop renal failure in pregnancy. How small the absolute number is can be judged by the relatively few deaths from renal failure in this large series of cases from a city where no therapeutic abortions or sterilizations are carried out for any indication. It must be very rarely that pre-eclampsia, whether complicated by eclampsia or not, causes death from damage to the patient's kidney or liver.

That there is much confusion about many even simple facts in the toxaemias of late pregnancy is hardly surprising when it is remembered that such widely different conditions as chronic nephritis (often

including unrecognized pyelonephritis or renal calculi), essential vascular hypertension and pre-eclampsia, are included. Classifications of abnormalities in midwifery practice must be based, as in other branches of medicine, on pathological changes and not on physical signs. Until greater effort is made to differentiate between the true toxaemias of pregnancy and chronic vascular or renal disease the confusion must remain. While the differential diagnosis may be difficult or even impossible in late pregnancy, if the changes are so marked as to lead to the death of the patient they should be demonstrable at thorough postmortem examination.

Accidental Haemorrhage

All cases of antepartum haemorrhage not proven to be from placenta praevia are classified as accidental. For this reason we limit our analysis to the fatal cases in all of which there was an element of concealed bleeding.

Thirty-two women died as a result of this condition. One of them had eclampsia and has already been referred to. She may have died as a result of the accidental haemorrhage so we include her here also. The real causes of death in the 32 cases were:

Uraemia	12
Shock	10
Postpartum haemorrhage	3
Pituitary necrosis	2
Complications of surgery	3
Spontaneous intraperitoneal haemorrhage ...	1
Incompatible blood transfusion	1

Uraemia. Twelve patients died in uraemia between the 5th and 15th days after the initial haemorrhage. Each had a steadily rising blood urea. Postmortem was carried out on 7 and bilateral renal cortical necrosis was demonstrated in all of these.

Besides these, 1 of the patients, recorded above under pituitary necrosis, at postmortem was shown to have a combination of that lesion with complete cortical necrosis. The other diagnosis of pituitary necrosis was a clinical one and this patient had anuria until her death on the 4th day. Apart from a patient who died from ruptured abdominal wall 10 days after Caesarean section, these are the 14 fatal cases who survived the acute stage of the haemorrhage.

Furthermore, 1 patient who died from shock 12 hours after the original haemorrhage was found to have well-defined renal changes, so that every patient who died from accidental haemorrhage and whose kidneys were examined at postmortem had this lesion. Cortical necrosis was not demonstrated in association with any other condition discussed in this paper.

Although we cannot be sure that all 5 of the patients who died in uraemia and were not examined postmortem had cortical necrosis rather than chronic kidney disease, still the association of accidental haemorrhage with renal damage contrasts very markedly with that of the toxaemias of late pregnancy where it is doubtful if any patient amongst 320 eclamptics and approximately 4,000 pre-eclamptics died from kidney damage as a result of these conditions.

We refer again to the fact that only 2 of these 32 fatal cases of accidental haemorrhage occurred in the large number of toxaemias of late pregnancy treated in hospital, whereas 164 of the total 320 eclamptic patients occurred in these cases. This would suggest that the association of the toxaemias of late pregnancy with accidental haemorrhage is not so close as is supposed. It is true that all fatal cases of accidental haemorrhage had albuminuria, but it is likely, in the majority of cases, that this albuminuria is a result of the immediate damage to the kidneys from the haemorrhage. It is said that these patients when

seen after the haemorrhage will have a subnormal blood-pressure as a result of shock which, in fact, most of them had, but we do not know if there is any evidence to uphold the supposition that the blood-pressure had been previously raised, in the majority of cases.

It is of considerable interest that 3 of the patients who died from bilateral cortical necrosis were delivered by Caesarean hysterectomy. This fact, taken in combination with the clearly established necrosis shown at postmortem in one case who died 12 hours after the original haemorrhage, would suggest that the mechanism resulting in the renal damage is released almost simultaneously with the haemorrhage. Shock is not the entire mechanism because some of these patients were not shocked.

Postpartum haemorrhage is a well-recognized sequela of accidental haemorrhage. Three of these patients died from it. All 3 were in good condition after delivery and in no case was the fatal haemorrhage a massive one. Each of the 3 patients continued to bleed moderately, but steadily, for several hours, in one case for 18 hours after delivery. Each of the 3 patients had a careful examination of the genital tract for trauma, exploration of the uterus, oxytocic drugs, bimanual compression, intra-uterine douches and plugging. Two of the 3 were eventually submitted to hysterectomy. In each case the genital tract was thoroughly exposed at postmortem.

As a result of recent work in America, there is now little doubt that the haemorrhagic tendency associated with abruptio placentae, of which postpartum haemorrhage is but one manifestation, is due to a fibrinogen deficiency in the mother's plasma. The concept that the bleeding after delivery resulted from poor retractile powers of the Couvelaire uterus must, therefore, be abandoned, with resultant reorientation of therapeutic measures.

There is, of course, excellent clinical evidence that accidental haemorrhage is associated with a deficiency in the clotting mechanism with a resultant haemorrhagic tendency which is not limited to the pelvis and certainly not to the placental site. In these cases under review there was ample evidence. Blood lost vaginally was often markedly slow to clot while venous puncture wounds sometimes oozed for several hours. Widespread ecchymoses and a tendency to easy bruising were noted frequently. Postmortem examinations usually revealed extravasations into the uterine wall and broad ligaments and one patient died from spontaneous intra-peritoneal bleeding. Two out of 15 patients treated by Caesarean hysterectomy died from post-operative intra-peritoneal bleeding and in neither case was there a distinct bleeding point or such accident as a slipped ligature.

We are particularly interested in 5 out of the total 300 patients under review and not included above, who died of massive extra-pelvic extravasations of blood. Two of them had retroperitoneal haemorrhages which were totally above the pelvic brim, 2 had extensive gastro-intestinal haemorrhages and 1 had an extra-peritoneal haemorrhage from the liver. The patient who had the bleeding from the liver had a mild pre-eclampsia and her liver showed typical changes. Not one of the other four had any underlying pathology and all were submitted to postmortem examination. No distinct bleeding vessels were found.

At least 1 patient with retroperitoneal haemorrhage and 1 with gastro-intestinal haemorrhage had subcutaneous extravasations simultaneously. We note particularly that not one had any pelvic bleeding nor any placental separation. We believe these may have been cases of extra-pelvic accidental haemorrhage. If they were, then the haemorrhagic tendency resulting from

fibrinogen deficiency is not a result of abruptio placentae but precedes and causes the placental separation and the antepartum haemorrhage, just as it causes the bleeding from places other than the placental site, and the postpartum haemorrhage.

The results from operative treatment in accidental haemorrhage are bad. Fifteen patients had Caesarean hysterectomy and 7 of them died, 3 from bilateral cortical necrosis, 2 from shock and 2 from post-operative intra-peritonal bleeding. Sixteen were delivered by Caesarean section and 2 died, 1 from shock and 1 from ruptured abdomen 10 days later. Two patients had hysterectomy for postpartum haemorrhage complicating abruptio placentae and both died.

Placenta Praevia

Nine hundred and fourteen cases of placenta praevia received treatment in the Dublin hospitals during the 10 years under review, and 17 of the mothers died, giving a mortality rate of 1.85 per cent. The causes of death were:

Antepartum haemorrhage	4
Ruptured uterus	4
Postpartum haemorrhage	2
Secondary postpartum haemorrhage with transfusion of incompatible blood	1
Transfusion of incompatible blood (probable ruptured uterus)	1
Operative deaths (associated with Caesarean section)	4

(*a*) Sudden collapse and death 4 hours following a classical section for central placenta praevia.

(*b*) Anaesthetic death.

(*c*) Death from haemorrhage during lower segment section for central placenta praevia.

(*d*) Cardiac failure 5 hours after lower segment section. Probable over-transfusion.

Mesenteric thrombosis	1

Eleven of the patients were delivered vaginally, 4 were delivered by Caesarean section and 2 died undelivered. Only 2 of the mothers who died were in poor condition when admitted to hospital and 1 of these was the only patient who had a vaginal examination prior to admission. The method of treatment was therefore not influenced by the condition of the patient on admission in 15 cases.

On 252 occasions a leg was brought down and 7 mothers died. Two of these succumbed to antepartum and 2 to postpartum haemorrhage, and 2, probably 3, to rupture of the uterus. Such are the risks of vaginal delivery in the presence of placenta praevia. The list above shows them to be present even when delivery is not preceded by manipulation.

There is no effective vaginal method of arresting antepartum haemorrhage due to low-lying placenta.

The typical postpartum haemorrhage does not seem to occur following abdominal section. Probably this haemorrhage is consequent to the dilatation of the lower segment in labour.

Rupture of the uterus is a major complication. It was proven in 7 cases, 4 of which were fatal. Three of these 4 were treated for postpartum haemorrhage for a considerable time before the correct diagnosis was made. From all the material reviewed in this paper nothing emerges more clearly than that when a patient with placenta praevia continues to bleed or gives other cause of anxiety after vaginal delivery, the integrity of her uterus should be established without delay.

Caesarean section was performed on 298 occasions and 4 of these mothers died. The

causes of death are listed above. Cases treated by this method represent a more serious group than those treated by "bringing down a leg" and yet the results are better. While the operation has its own risks, immediate and remote, it does reduce the dangers of antepartum and postpartum haemorrhage and eliminate the danger of ruptured uterus at least in the present pregnancy.

Since many cases subjected to vaginal manipulation and delivery were those in which delivery of a surviving infant seemed unlikely, we conclude that the condition of the foetus should rarely influence the mode of delivery in placenta praevia.

Ruptured Uterus

Ruptured uterus is one of the greatest disasters which can befall the obstetrical patient, not only because of the high mortality with which it is associated, but also because it demands such radical treatment. There are 63 patients with ruptured uteri reported in this analysis and more than two-thirds of these patients were in hospital at the time the rupture occurred. Twenty mothers died—14 from shock, 5 from sepsis and 1 from mesenteric thrombosis. Forty patients had hysterectomy performed and 6 of these died.

The cases of ruptured uterus may be classified as follows:

	No.	Deaths
Spontaneous rupture	15	8
Rupture of previous section scar ...	12	1
Lower segment ... 6		
Classical 6		
Rupture due to hydrocephalus ...	9	3
Rupture due to pitocin	7	3
Two cases recorded under section scars—both lived		
One case recorded under placenta praevia—died		
Rupture associated with placenta praevia	7	4
Rupture due to internal version ...	5	0
Rupture during trial of labour ...	4	1
Rupture due to transverse lie ...	2	1
Rupture associated with manual removal of placenta	2	0
Rupture due to application of forceps before cervix fully dilated	1	0
Rupture caused by Kielland's forceps blade	1	0
Rupture due to perforation of uterus at previous dilatation and curettage	1	0

NOTE—These cases total up to 66 with 21 deaths, but 3 cases with 1 death are entered twice. (See Rupture due to pitocin.)

Rupture of previous section scar ranked high in the list of causes of ruptured uterus, but it was accompanied by a comparatively low maternal mortality as, of 12 cases, 1 mother died. The diagnosis in all cases was without delay and the treatment was prompt. Six of the ruptures followed lower segment sections with 1 death, and 6 followed classical sections with no death. Five of the 6 classical scars ruptured during pregnancy and all 6 of the lower segment scars during labour.

It is noteworthy that only 5 of the 63 women who suffered rupture of the uterus were primigravidae. Two of these were undergoing trial of labour in hospital and in both cases the uterus was successfully repaired. One of the other 3 was in hospital when the uterus ruptured consequent to internal version for a brow presentation. This patient was treated by hysterectomy and survived. The remaining 2 women were admitted to the hospitals' service with the uteri already ruptured, in one case due

to an undiagnosed hydrocephalus and in the other due to attempted delivery with forceps before full dilatation of the cervix. The mother of the hydrocephalic died before any operative treatment could be undertaken while the other recovered without any operation.

It is quite remarkable that only 2 cases of ruptured uterus occurred as a result of disproportion, apart from the case of hydrocephalus recounted above, amongst 31,254 primigravidae and neither lost her uterus or her life. The incidence of rupture amongst primigravidae was less than 1 in 6,000, and in primigravidae as a result of disproportion less than 1 in 15,000. Significant degrees of disproportion are patently not frequent.

Hydrocephalus accounted for 9 cases of rupture with 3 deaths. In 4 the rupture occurred in hospital. Eight patients were multiparae. Delay in diagnosis was the chief determining factor in the fatal cases.

Reference has previously been made to rupture of the uterus as a complication of placenta praevia. It occurred 7 times with 4 fatalities. Three of the 4 were treated for a considerable time for postpartum haemorrhage before the diagnosis was made, and the consequent delay in great measure accounted for the fatal outcome here.

Pituitary extract was involved in 7 cases, 3 of them fatal. In 4 it was administered to induce, and in 3 to accelerate, labour. Two of these patients had Caesarean scars and 1 had a placenta praevia.

There were 15 cases of spontaneous rupture of the uterus and 8 of these patients died. They were all "grandes multiparae"—the average parity being 9.5. In each case the rupture appeared unpredictable and no cause was subsequently found. In some the rupture appeared before the onset of labour, in others early in labour with the membranes intact, and in more late in the first stage or during the second stage of labour, but the majority of cases manifested themselves after delivery.

From studying the histories of all the cases of ruptured uterus we concluded that there was often a delay in diagnosis of this condition, particularly after the birth of the baby, and that there was a tendency to credit the collapse of the patient to shock or haemorrhage with subsequent loss of valuable time. It would be well to adopt a system whereby the uterus would be explored routinely when the patient collapses in or after the third stage of labour.

Postpartum Haemorrhage

Including all cases where death occurred in association with, as well as a direct result of, postpartum haemorrhage there were 20 fatalities in the hospitals during the 10 years under review. These may be divided into complicated and uncomplicated cases. The latter group, composed of 10 cases of true postpartum haemorrhage, will be discussed here.

The associated conditions in the 10 complicated cases which are excluded from the discussion may be presented briefly thus:

(1) Placenta praevia with bipolar version ... 2
  (*a*) Unsuspected ruptured uterus found at postmortem.
  (*b*) No postmortem. Possible ruptured uterus.

(2) Incompatible blood transfusion 2
  (*a*) For secondary postpartum haemorrhage following placenta praevia.
  (*b*) For true postpartum haemorrhage in case of probable Rhesus sensitization.

(3) Accidental antepartum haemorrhage ... 3

(4) Traumatic haemorrhage 2
  (*a*) Following previous Manchester operation.

(*b*) Unrecognized hydrocephalus, possible ruptured uterus. Not included in ruptured uterus table.

(5) Following Caesarean section 1
Postpartum haemorrhage and collapse 3 hours after lower segment Caesarean section early in labour for foetal distress. Revived. Collapse and death 6 hours after operation without further bleeding.

The 10 cases of true, or uncomplicated, postpartum haemorrhage on which the discussion is based may be classified as:

Delivered in hospital	4
Admitted after delivery	5
Dead on admission	1

In each of the emergency admissions, 5 living and 1 dead, the placenta was still *in utero*. All 6 were beyond aid and in only 1 case was the placenta removed after admission. Death in each case was without doubt due to failure to remove the placenta manually, and in time.

As only 4 patients delivered in hospital died in association with uncomplicated postpartum haemorrhage the individual histories are worth recounting. How far the haemorrhage was an absolute or contributory cause of the fatal outcome can be left to the reader.

(1) Spontaneous delivery of dead foetus. Manual removal for postpartum haemorrhage. Uneventful puerperium until sudden and unexpected death on the 9th day postpartum. No clinical signs of infection, but at postmortem a low grade infection of the uterine cavity only was reported. (Year 1940.)

(2) Breech extraction under general anaesthesia (uterine inertia, 40 hours in labour, membranes ruptured, intranatal infection) followed by manual removal for postpartum haemorrhage. No further bleeding. Blood transfusion. Patient's condition gave no cause for anxiety until sudden death 6 hours later. Postmortem revealed no abnormality.

(3) Spontaneous delivery. Placenta retained 90 minutes, then Credé's expression for mild postpartum haemorrhage. Condition satisfactory and no further bleeding. Collapse, 30 minutes later, restored by blood transfusion. Sudden death 6 hours after delivery without further bleeding. Postmortem revealed no abnormality.

(4) Spontaneous delivery of macerated foetus followed by considerable and continous postpartum haemorrhage. Manual removal delayed until an hour later when patient moribund. Death immediately following removal of placenta which was large and unhealthy. (Year 1945. Rhesus incompatibility.)

Only the last death is quite clearly due to haemorrhage and the Master of that hospital has recorded that death in this case resulted from delay in removing the placenta. Haemorrhage is clearly not the real cause of death in the first patient who died on the 9th day of the puerperium. Death in the second patient was probably the summation of many contributory factors. The remaining case presents as a delayed shock in the absence of any considerable bleeding—the nature of which may be obscure or caused by Credé's manoeuvre.

As these are the only deaths associated with uncomplicated postpartum haemorrhage amongst 96,365 deliveries the management of the third stage of labour can justly be said to have reached a very high degree of perfection in the Dublin hospitals, yet when we survey the extern deliveries of the same hospitals the picture changes. Seven patients delivered on the

district died from uncomplicated postpartum haemorrhage. Two of these were emergency admissions to hospital and are included above. During the same period there were 28 deaths from all causes on the district and postpartum haemorrhage is the largest factor in maternal mortality. Since the district represents a series of normal deliveries under domestic conditions it is probable that the causes of death are similar to those in general practice. It is interesting to note that 3 of the patients who died on the district had blood transfusions although they were still bleeding and the placentae were still *in utero* when they died.

Current elaborate teaching on the treatment of postpartum haemorrhage is largely responsible for the fact that this complication results in so many deaths outside hospital. There is widespread belief that without an anaesthetic, uterine douche, a plug and a blood transfusion, together with considerable operative experience, the treatment of postpartum haemorrhage is impossible. We believe that the treatment of the uncomplicated case of postpartum haemorrhage begins and ends with manually removing the placenta without delay, and that no practitioner can be justified in attending a woman in labour unless he is prepared to carry out this procedure unaided.

It need hardly be reiterated that blood transfusion is never a treatment for haemorrhage. Through incompatibility it accounted directly for 2 of the 20 deaths in hospital recorded here, and by diverting attention from the placenta it accounted indirectly for 3 deaths on the district.

We are convinced that the real cause of death in the majority of cases of postpartum haemorrhage is not exsanguination but shock resulting from indiscriminate attempts at Credé's expression of the placenta. It is likely that every one of the emergency admissions quoted above died in this way, and 1 of them showed extensive tearing and bruising of the peritoneal surface of the uterus at postmortem. Credé's manoeuvre is the hidden danger of the third stage. Under no circumstances is it as safe as a manual removal, yet the majority of practitioners will carry out Credé's manoeuvre an indefinite number of times in the hope that they can thereby avoid manual removal. Since loss of blood is almost always reversible by transfusion, we believe that each one of the emergency admissions above could have been revived were they not irreversibly shocked.

Manual removal of the placenta is a direct and certain method of arresting uncomplicated haemorrhage. That it is a simple and safe procedure is illustrated by the following figures. During these 10 years a placenta was removed manually 1,113 times for all indications (857 in hospital and 256 on the district). Two cases of ruptured uterus are recorded but both patients survived. Thirteen of the patients died (9 in hospital and 4 on the district). The causes of death were as follows:

Infection	3
Hospital 2 (Both in the year 1940)	
Chronic uterine infection	1
Pulmonary embolus	1
District 1 (Year 1942)	
Pulmonary embolus	1
Haemorrhage	4
Hospital 2	
Emergency postnatal admission ...	1
Delivered in hospital	1
District 2	
(All 4 deaths due to delay in removing the placenta)	
Incompatible blood	1
Died 21 days after manual removal.	

Placenta praevia (with Braxton-Hicks version) 2

Undiagnosed ruptured uterus (diagnosed at postmortem) as a result of placenta praevia and version 1

No postmortem, but also a possible ruptured uterus 1

1 Died 24 hours following undiagnosed hydrocephalus and manual removal and was a possible ruptured uterus from hydrocephalus.

1 A grade IV cardiac on district and died 2 days after delivery in congestive heart failure.

1 Died unexpectedly 5 hours after breech extraction when in labour 40 hours with the membranes ruptured and intranatal infection. Death here was probably a culmination of many contributory factors.

No patient has died from infection following manual removal of the placenta in hospital or on the district since the year 1942. A considerable number of the total had their placenta removed without an anaesthetic. For manual removal in postpartum haemorrhage an anaesthetic is unnecessary and often undesirable. Anaesthetics contribute to haemorrhage by paralysing the uterus, but more so by causing delay.

We conclude with a plea for simplification in the teaching of the treatment of postpartum haemorrhage. Simplicity here is the essence of teaching and speed the essence of its application. Practitioners must be taught not to send cases of postpartum haemorrhage to hospital, but to remove the placenta manually, without an anaesthetic if necessary.

Sepsis

In this section dealing with death from infection of the genital tract 38 cases are recorded. They are classified below. It will be noted that death from infection following uncomplicated vaginal delivery of a fresh or living foetus was a rare occurrence. Almost all deaths occurred following complicated or assisted delivery or delivery of a macerated foetus. It may be that the infecting organism in the majority of these was other than the haemolytic streptococcus. This may explain why there was no significant difference in the number of deaths in the first and second halves of the decade under review, that is since the introduction of the antibiotics. There were only 3 deaths from infection associated with abortion or miscarriage and 2 of these were infected on admission. Criminal abortion is not a problem in Dublin.

Classifications of death from Sepsis

(1) Association with Caesarean section 8

Lower segment sections late in labour 5

Repeat classical sections (not in labour) 2

Lower segment section following artificial rupture of the membranes—absent foetal heart 1

Three of the deaths in this group occurred in 1948 and 1 in 1947. There was 1 death from pulmonary embolus and the remaining patients died from peritonitis.

(2) Associated with ruptured uterus 5

(3) Associated with destructive operations on dead infants (including 1 manual removal) 5

(4) Associated with uterine inertia (delivered vaginally; destructive operations not included) 4

(5) Associated with intra-uterine death of foetus (destructive operations not included) 4

(6) Associated with miscarriages 3

(7) Associated with spontaneous delivery (uncomplicated) 2
(8) Associated with pelvic tumours 2
(9) Associated with forceps delivery 2
(10) Associated with manual removal (exclusive of 1 case included above) 1
(11) Associated with eclampsia 1
(12) Unclassified 1

Rheumatic Heart Disease

Possibly the most striking result of the recent improvement in the treatment of infection, haemorrhage, etc., is the increase in the relative importance of the constitutional diseases as causes of maternal mortality.

Rheumatic heart disease is by a long way the most important constitutional disease in obstetrics. As a pure cause of death it ranked second to eclampsia in the Dublin hospitals during the past decade. Thirty-three patients died in the hospitals and 2 on the district. One of these also had eclampsia, but the remaining 34 had no other complication. From the published reports of other teaching centres throughout the English-speaking world it would certainly appear that rheumatic heart disease is now the first cause of maternal mortality. Possibly only the large number of emergency admissions relegates it to second place in Dublin.

When rheumatic heart disease occupies a position of such importance in the mortality figures it is anomalous that many hospitals devote no special record to the condition in their annual reports. The recommendation of the Royal College of Obstetricians may rectify this anomaly, but it has not given a good lead in recommending a loose "Cardiac Table". When virtually every woman dies eventually from cardiac failure, when functional murmurs and arrhythmias are so common in pregnancy, and when there are so many diseases of the heart—can a loose Cardiac Table do other than lead to the same confusion in heart disease as the classification of the toxaemias has already done in this subject? In the past 10 years in Dublin no patient died from congenital or syphilitic disease of the heart and, exclusive of eclampsia, only 1 died from hypertensive heart failure.

The records of the 32 fatal cases of uncomplicated rheumatic heart disease show that the majority died because the lesion was not diagnosed until congestive failure had developed, usually late in pregnancy or in labour. Respiratory infection was a common precipitating factor. It seems that every patient had mitral stenosis, rarely combined with aortic incompetence. These observations only substantiate long established facts.

There is little doubt that the majority of women who die from this condition could be saved. The reduction of mortality from rheumatic heart disease is one of the major problems in obstetrics to-day. The first factor in reduction is diagnosis, the second is antenatal management, and the third is mode of delivery. Diagnosis is unquestionably the most important of the three.

The modern trend to high specialization has to a considerable extent resulted in rheumatic heart disease in pregnancy being regarded as falling within the particular responsibility of the physician. This has some quite disastrous effects.

If the condition is to be diagnosed it must be the ordinary practitioner or ante-natal officer who will do it. It is a fallacy to believe that diagnosis needs any specialist experience or any special diagnostic aids. It does, however, necessitate auscultation of the heart for presystolic murmur. Therein lies the main reason why so many of these women die.

Virtually the only factor of importance in the ante-natal management is rest. The

amount of rest desirable is ascertained by frequent reassessments of the cardiac reserve. Because this is simple it can be done well by the obstetrician who understands the stress and complications of pregnancy.

It is never desirable that the physician should decide on the mode of delivery as he has little clear appreciation of what Caesarean section or any obstetrical complication or operation entails. For years many patients have been subjected to therapeutic abortion, sterilization and Caesarean section on the advice of physicians. It is extremely doubtful if any such operations are beneficial in rheumatic heart disease.

The diagnosis of valvular disease is within the scope of every practitioner and the management and choice of method of delivery within the scope of every obstetrician. The majority of patients die because the lesion is not diagnosed until decompensation occurs. This is largely so because the ordinary practitioner or antenatal officer regards disease of the heart as being outside his domain. Until this attitude is corrected many women will continue to lose their lives unnecessarily from rheumatic heart disease in childbearing.

Summary

(1) There were 300 maternal deaths in the Dublin hospitals in the decade 1940–50, and 192, or 64 per cent, occurred as a direct result of the complications reviewed. One hundred and eight, or 36 per cent, died as a result of other conditions.

(2) The main causes of death were eclampsia, sepsis, rheumatic heart disease and accidental haemorrhage.

(3) The treatment of eclampsia has not improved since Tweedy's day. Prevention is very far from satisfactory.

(4) The non-convulsive toxaemias of late pregnancy accounted for 15 deaths and 10 of these were known cases of essential hypertension. Only 3 of the fatal cases were known pre-eclamptics, and 2 of these died from infection. It is questioned if pre-eclampsia or eclampsia ever produces fatal damage to kidney or liver. The inclusion of such essentially different conditions as essential hypertension, chronic nephritis or pre-eclampsia has led to great confusion in the basic facts here.

(5) The association of accidental haemorrhage with the toxaemias of pregnancy is disputed. It is suggested that the haemorrhagic tendency in this condition is the primary factor, causing haemorrhage with resultant separation of the placenta. Accidental antepartum haemorrhage is the cardinal factor in the production of renal damage.

(6) Placenta praevia as a cause of maternal mortality is becoming less important. Much of the remaining mortality results from reluctance to perform Caesarean section without the likelihood of a surviving infant.

(7) Ruptured uterus is pre-eminently a complication of the multigravida. Failure to establish the diagnosis is the biggest factor in the resultant mortality.

(8) Uncomplicated postpartum haemorrhage as a cause of maternal mortality in hospital is negligible. If the district services are representative of general practice it is the biggest cause there. A plea is made for simplicity in teaching and for early manual removal without anaesthesia.

(9) Sepsis remains a major cause of maternal mortality but rarely in the uncomplicated case.

(10) Most fatal cases of rheumatic heart disease occurred because the condition was not diagnosed. The condition was not diagnosed because the heart was not examined. Examination of the heart for valvular disase must be of equal importance with testing the urine and taking the blood-pressure in routine ante-natal care.

Conclusion

Much remains to be learned about many of the commonest complications in obstetrics. Accurate diagnosis and classification is essential. Loose classifications such as in the "Toxaemias of Pregnancy" and "Cardiac Disease" cannot but lead to confusion. Routine and complete post-mortems would do much to put these subjects on a more rational and scientific basis.

In conclusion we gratefully acknowledge our debt to successive Masters of the three Dublin Maternity Hospitals for allowing us to review their work.

CARDIAC OUTPUT IN HYPERTENSIVE TOXAEMIAS OF PREGNANCY

BY

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RIGHT heart catheterization, introduced by Cournand and Ranges (1941), has proved to be the most reliable method of determining cardiac output not only in health but also in disease. This method has been used by several workers to investigate the behaviour of the cardiac output in normal pregnancy (Werkö *et al.*, 1948; Palmer and Walker, 1949; Hamilton, 1949a). The results obtained by Palmer and Walker, and by Hamilton agree closely and show that the maximum increase in cardiac output is of the order of 27 per cent above the non-pregnant level and is attained during the 26th to 29th weeks of pregnancy. The output virtually returns to normal levels during the last 3 weeks of pregnancy.

When the study of the normal range of variation in cardiac output during pregnancy had been completed the investigation was extended to cases of toxaemia of pregnancy. All the toxaemic patients investigated shared the common feature of hypertension and the results of the first 44 cases of toxaemia were reported by Hamilton (1950). They showed that an increase in cardiac output was found in some cases of hypertension, some cases of pre-eclampsia and in all cases of hypertension with superimposed toxaemia. However, in many of these cases the final diagnosis could only be a presumptive one as these patients were seen for the first time as emergencies during the last trimester of pregnancy. Therefore all cases already studied, who had not been seen before the 20th week of gestation, were excluded from any further analyses, and cardiac catheterization was restricted thereafter to those patients in whom an adequate and reliable antenatal history had been obtained, and thus the diagnosis was made more accurate.

The technique of cardiac catheterization was identical with that used in the normal series (Hamilton, 1949a) and the patients were under similar basal conditions.

The Standard denoting "Hypertension"

The classification of the toxaemias of pregnancy is notoriously difficult, and even the maximum blood-pressures accepted as normal are disputed. We considered any blood-pressure reading taken under non-basal conditions attaining or exceeding either 140 systolic or 90 diastolic to be indicative of hypertension. Under basal conditions a blood-pressure sustained at not less than 140/80 was taken to indicate the presence of hypertension. This lower diastolic level was chosen as it was found that despite high diastolic pressures obtained in the wards a fall to below 90 was recorded in many cases once basal

conditions had been established. Many patients showing hypertension in the ward exhibited pressures within normal limits under basal conditions and they have been excluded from the analyses.

Criteria of Diagnosis

The diagnosis of pre-eclampsia was based on the presence of hypertension, with or without oedema or albuminuria commencing after the 20th week of gestation.

Essential hypertension was diagnosed in those patients who had a pressure of 140/90 on at least 2 occasions before the 20th week of gestation, the pressure being sustained at or about this level throughout the remainder of pregnancy. Some patients showed a slight mid-pregnancy fall in pressure, but not to a level below 130/80. Patients who showed a greater and more sustained mid-pregnancy drop were designated labile hypertension. Some cases of essential hypertension developed the signs of pre-eclampsia in the last weeks of pregnancy. The onset of the latter condition was heralded by a further rise of diastolic pressure (amounting to at least 20 mm. mercury) and the development of oedema and/or albuminuria. These cases were classified as having essential hypertension with superimposed pre-eclampsia.

The remaining patients had chronic nephritis. Albuminuria with or without hypertension was present before the 20th week of pregnancy. All but 1 of the 6 patients gave a history of previous acute nephritis, and urea clearance tests showed renal impairment.

The Material

The cases of pre-eclampsia have been divided into 2 groups. The first consisted of patients who showed hypertension, oedema and albuminuria, the last sign being present on 2 or more occasions in a catheter specimen. The second group consisted of patients who had had any of the following combination of signs: hypertension and albuminuria, hypertension and oedema or hypertension only. Generally speaking the cases in the first group were of greater clinical severity than those in the second group, but this ruling did not hold good in every case.

The material finally consisted of 25 cases of pre-eclampsia (14 Group I, and 11 Group II), 26 cases of essential hypertension, 9 cases of essential hypertension with superimposed toxaemia, 11 cases of labile hypertension and 6 cases of chronic nephritis, a total of 77 toxaemic patients.

The Results

The readings obtained for cardiac output and several associated variables have been analyzed and compared with each other and with those obtained in the normal series of 68 cases (Hamilton, 1949a).

1. *The Cardiac Output*

Normal Series

The cardiac output in normally pregnant women commences to rise during the 10th to 13th weeks of pregnancy and reaches a maximum of 5.73 litres per minute during the 26th-to-29th-weeks period. This represents an increase of 27 per cent above the non-pregnant level. The output has virtually returned to normal levels during the 38th to 40th weeks.

In these 68 cases the actual output varied from the mean curve by not more than 500 ml. in 74 per cent of cases. Thirteen per cent showed a decrease and 13 per cent an increase from the mean curve which, in each case, varied from 500 to 1,000 ml. (Table I).

Pre-eclampsia, Group I. (Hypertension, Oedema and Albuminuria)

In no case was the cardiac output within normal limits. The output was increased in 92.5 per cent and decreased in 7.5 per

cent of the cases. In approximately two-thirds of the cases the increase was of a moderate degree, amounting to 600 ml. to 1,500 ml. above the normal level for the period of gestation attained. The maximum increase recorded was 3,500 ml. and the maximum decrease 1,700 ml. (Table I).

Pre-eclampsia, Group II (Hypertension and Oedema, or Hypertension and Albuminuria, or Hypertension alone)

In this group 55 per cent of the cases had readings within the normal limits. The remaining cases were approximately evenly distributed between increased and decreased output. The maximum decrease was 2,000 ml. and the maximum increase 1,600 ml. (Table I).

Essential Hypertension

The output was within normal limits in 57 per cent of cases. In 12 per cent an increase in output was recorded, the maximum increase being 750 ml. In 31 per cent decrease was recorded, the maximum decrease being 1,700 ml. (Table I).

Essential Hypertension + superimposed Pre-eclampsia

The output was increased in all cases of hypertension with superimposed toxaemia. The increase was moderate in 56 per cent (600 to 1,500 ml.) and amounted to 1,600 to 2,500 ml. in 22 per cent, and to 2,600 to 3,500 in the remaining 22 per cent (Table I).

Labile Hypertension

Twenty-eight per cent of these cases had cardiac outputs within normal limits. The remaining 72 per cent showed an increase of from 500 to 2,500 ml. (Table I).

Chronic Nephritis

In 33 per cent of these patients the cardiac output was normal; in 67 per cent it was decreased by 600 to 1,600 ml. (Table I).

The cardiac output is within normal limits in cases of essential hypertension. Such cases thus seem to react in a similar manner to pregnancy as do normal patients. Cases of labile hypertension show a moderate increase in output.

Cases of severe pre-eclampsia, whether occurring in the previously normal or the previously hypertensive patient, have either a moderately or markedly raised cardiac output. The criterion of "severity" appears to be the presence of all three cardinal signs of toxaemia, namely hypertension, oedema, and albuminuria.

TABLE I

Cardiac Output in Normal and Toxaemic Pregnancies

The range of variation of the cardiac output is shown as a percentage

CARDIAC OUTPUT	Normal Pregnancy (per cent)	Essential Hypertension (per cent)	P. E. T. Group I (per cent)	P. E. T. Group II (per cent)	Essential Hypertension & P.E.T. (per cent)	Labile Hypertension (per cent)	Chronic Nephritis (per cent)
Normal ±500 ml.	74	57	0	55	0	28	33
Increase 600–1,500 ml.	13	12	57	18	56	36	0
Increase 1,600–2,500 ml.	0	0	28	9	22	36	0
Increase 2,600–3,500 ml.	0	0	7·5	0	22	0	0
Decrease 600–1,500 ml.	13	23	0	9	0	0	50
Decrease 1,600–2,500 ml.	0	8	7·5	9	0	0	17

The presence of albuminuria *per se* does not bear any relation to the level of the cardiac output. Cases showing mild and moderate degrees of pre-eclampsia (one or two signs only) have outputs which are on the whole within normal limits. They show approximately the same range of variation as the cases of essential hypertension.

Two-thirds of the patients with chronic nephritis in pregnancy have a decrease in cardiac output; the output in the remaining one-third is within normal limits.

In an attempt to determine what factor is responsible for the changes in cardiac output seen in cases of toxaemia of pregnancy the parts played by the numerator and denominator of the Fick equation have been studied.

2. *Oxygen Consumption*

In normal pregnancy the oxygen consumption rises steadily from the non-pregnant level of 211 ml. per minute to reach a maximum level of 251 ml. per minute during the third trimester (Hamilton, 1949a). In all cases of toxaemia the oxygen consumption was increased (Table II). In essential hypertension the increase was slight (262 ml. per minute). In labile hypertension and in pre-eclampsia, Group II, the increase was moderate (288 and 273 ml. per minute respectively), whereas in cases of pre-eclampsia, Group I, and essential hypertension with superimposed pre-eclampsia, the increase was even greater amounting to 291 and 296 ml. per minute respectively.

The cases of nephritis in pregnancy were catheterized during the second trimester and their mean oxygen consumption was 229 ml. per minute, i.e., within normal limits, the level during that period of gestation in a normal pregnancy being 234 ml. per minute.

3. *The Oxygen Arterio-venous Difference*

The oxygen A.V. difference in normal pregnancy remains at or about the normal non-pregnant level of 45 ml. per litre (Hamilton, 1949a) until the last 3 weeks of pregnancy when a marked increase is found (Table III). Each group of toxaemic cases has therefore been similarly analyzed, cases up to and including the 37th week of gestation and those during the 38th to 40th weeks being grouped together. The results are best seen in Table III. In essential hypertension the oxygen A.V. difference was increased in each group and the increase was of approximately the same magnitude at each period of gestation. In essential hypertension with superimposed pre-eclampsia the oxygen A.V. difference was depressed in both groups. In labile hypertension the oxygen A.V. difference was normal in the earlier weeks and increased in the last 3 weeks of pregnancy. This latter increase

TABLE II

Oxygen Consumption in Normal and Toxaemic Pregnancies

		Normal Pregnancy	Essential Hypertension	P. E. T. Group I	P. E. T. Group II	Essential Hypertension & P.E.T.	Labile Hypertension	Nephritis
Oxygen Consumption in ml./min.	2nd. Trimester	234	—	—	—	—	—	229
	3rd. Trimester	251	262	291	273	296	288	—

TABLE III

Oxygen Arterio-venous Difference in Normal and Toxaemic Pregnancies

		Normal Pregnancy	Essential Hypertension	P. E. T. Group I	P. E. T. Group II	Essential Hypertension & P.E.T.	Labile Hypertension	Chronic Nephritis
O_2 A.V. Difference in ml./litre	0–37 weeks	43.99	52.8	51.3	52.9	41.5	44.6	50.7
	38–40 weeks	55.2	61.8	48.7	59.2	47.9	62.75	—

paralleled that seen at the same period in essential hypertension.

In pre-eclampsia, Group II, the oxygen A.V. difference was increased in both gestational groups. In chronic nephritis there was a slight increase in oxygen A.V. difference.

Table IV contrasts the behaviour of the oxygen consumption, oxygen arterio-venous difference, and cardiac output in the several types of hypertensive toxaemia with the levels found in normal pregnancy. It will be observed that the increase in cardiac output in cases of both essential hypertension with superimposed pre-eclampsia and pre-eclampsia, Group I, is the result of an increased oxygen consumption being associated with a decreased oxygen arterio-venous difference. Patients with pre-eclampsia, Group II, do not differ from cases of normal pregnancy. In essential hypertension the oxygen consumption and oxygen arterio-venous difference are proportionately increased and the cardiac output remains unchanged.

To summarize, in cases of severe pre-eclampsia whether arising in a previously healthy patient or whether superimposed on a pre-existing hypertension the cardiac output is increased, often markedly so. Cases of mild pre-eclampsia and essential hypertension show a wider range of

TABLE IV

Oxygen Consumption, Oxygen Arterio-venous Difference, and Cardiac Output in Hypertensive Toxaemias as compared with Normal Pregnancy

Diagnosis	Oxygen Consumption	Oxygen Arterio-venous Difference	Cardiac output
Essential Hypertension	+	+	N
Labile Hypertension	+	N or +	+ or N
Essential Hypertension + P.E.T.	+	−	+
Pre-eclampsia Group I	+	−	+
Pre-eclampsia Group II	N	N	N
Nephritis	N	+	−

KEY. N=no change, +=increase, −= decrease from normal pregnant levels for the period of gestation.

variation in output than do normally pregnant women, but in each group in the majority of cases the output is within normal limits. In nephritis the cardiac output is usually depressed below normal limits and is never raised.

4. *The Right Auricular Pressure (R.A.P.)*

The R.A.P. was unaltered in all cases of toxaemia excepting nephritis (Table V). In 2 of the 6 cases of nephritis a positive pressure was recorded, one in a case 16 weeks pregnant (in hospital for observation only) and the other in a woman extremely ill at the 30th week of gestation with pre-eclampsia superimposed on the chronic nephritis. In the remaining 4 cases the R.A.P. was within normal limits.

5. *The Pulse Rate*

All patients were under basal conditions and the rate recorded was that attained after the cardiac catheter had been in position for 30 minutes. The basal pulse rate during the third trimester of normal pregnancy was 78 per minute. It was unaltered in cases of pre-eclampsia, nephritis and essential hypertension with superimposed pre-eclampsia. In cases of essential and labile hypertension the pulse rate was slightly increased (Table V).

6. *The Basal Blood-pressure*

The basal blood-pressure was the level attained after the catheter had been in position for 30 minutes. It was usually considerably lower than either non-basal ward readings or the first readings taken during catheterization. The average readings obtained are shown on Table V.

7. *The Stroke Volume*

The stroke volume in normal non-pregnant women is 63 ml. It is not altered from this level during the first trimester and last 3 weeks of pregnancy. It is increased to 72 ml. from the 14th to 37th weeks of normal pregnancy (Hamilton, 1949b). The toxaemic groups have been subdivided according to the period of gestation, 14 to 37 weeks and 38 to 40 weeks.

In essential hypertension a normal cardiac output was associated with an increased pulse rate, hence the stroke volume was decreased (Table V).

In essential hypertension with superimposed pre-eclampsia, on the other hand,

TABLE V

R.A.P., Pulse Rate, Blood-Pressure and Stroke Volume in Normal and Toxaemic Pregnancies

		Normal Pregnancy	Essential Hypertension	P. E. T. Group I	P. E. T. Group II	Essential Hypertension & P.E.T.	Labile Hypertension	Nephritis
R.A.P. in cm. Saline		−3·5	−4	−2·5	−3·5	−3·5	−4·3	−0·5
Pulse rate per minute		78	90	81	83	78	90	77
Blood-Pressure (average)		114/72	140/90	138/89	132/92	152/102	129/87	140/90
Stroke Volume in ml.	14–37 weeks	72	57	72	66	86	72	60
	38–40 weeks	62	49	78	60	84	54	

the output was increased but the pulse rate was normal and the stroke volume accordingly increased. In labile hypertension the stroke volume was within normal limits up to 37 weeks but was decreased in the 2 cases catheterized during the last 3 weeks of pregnancy (each of which had normal output). In pre-eclampsia, Group I, the stroke volume was normal in the 5 cases catheterized before the 38th week, and was increased in the 9 cases catheterized after the 38th week. In cases of pre-eclampsia, Group II, the stroke volume was slightly decreased in both gestation groups. In nephritis the stroke volume was decreased.

Discussion

The presence of hypertension may be the first sign heralding the onset of one of the toxaemias of pregnancy. The hypertension may antedate conception or may appear for the first time during pregnancy. The latter type of hypertension may or may not disappear after delivery; the former type persists. Hypertension indicates the presence of some abnormality in the circulatory haemodynamics. Before the introduction of cardiac catheterization there was no method of directly assessing the impact of this abnormality on cardiac function. By means of cardiac catheterization, we can now measure accurately and directly the minute output of the heart under normal and pathological conditions. In normal pregnancy the cardiac output is increased during the greater part of gestation; the implication of this rise and of the terminal fall in output have already been discussed (Hamilton, 1949a).

The present investigation shows that the behaviour of the cardiac output varies with the type of toxaemia. In essential hypertension the cardiac output is within the normal pregnant limits though it shows a greater range of variation. This is not unexpected as non-pregnant patients with essential hypertension show no alteration in output (Richards, 1945) and it was reasonable to suppose that pregnant hypertensives would behave as did normally pregnant patients, providing that no other complicating factors arose. Cases of labile hypertension show wide variation in blood-pressure throughout pregnancy and a marked fall once basal conditions have been established. It is conceivable that these cases over-respond to adrenergic stimuli and they probably belong to the category of patients with a high cardiac output (McMichael and Sharpey-Shafer, 1944). It is reasonable to suppose that, as their hypertension becomes more stable, they will merge with the established essential hypertension group and that their cardiac outputs will then return to normal limits. Patients who have essential hypertension at the commencement of pregnancy are far more liable to develop superimposed pre-eclampsia than patients with normal blood-pressures (Browne and Dodds, 1942; Chesley and Annitto, 1947). All the 9 patients who had essential hypertension with superimposed pre-eclampsia had markedly increased cardiac outputs. This was also the case in those patients with pre-eclampsia who presented all three cardinal signs of the toxaemia. Patients who had only one or two signs of toxaemia showed very little alteration in the level of the cardiac output. The reason for this discrepancy is not obvious, but it is clear that in most cases of severe pre-eclampsia, whether arising *de novo* or whether superimposed on a pre-existing hypertension, the cardiac output is markedly increased, indicating that a major alteration has occurred in the cardiovascular haemodynamics. In less severe cases of pre-eclampsia and in labile hypertension the cardiac output shows a greater range of

variation than is found in normal pregnancy.

Cases of chronic nephritis in pregnancy show a marked decrease in cardiac output, though these results must be regarded as merely suggestive, as the number of cases was small.

Summary

1. The cardiac output in 77 cases of toxaemia of pregnancy has been investigated using the method of cardiac catheterization. The results have been compared with those found in a similar group of normally pregnant patients investigated under identical conditions.

2. In the 26 cases of essential hypertension the cardiac output was unaltered. In 11 cases of labile hypertension the cardiac output was moderately increased in 72 per cent. In 9 cases of essential hypertension with superimposed pre-eclampsia the cardiac output was increased in 100 per cent.

3. Cases of pre-eclampsia showing all three cardinal signs (14 cases) had a raised cardiac output in 92.5 per cent. Eleven cases of pre-eclampsia with only one or two signs had cardiac outputs within normal limits.

4. In the 6 cases of chronic nephritis in pregnancy decreased outputs were found in 67 per cent.

5. The factors contributing to the determination of the cardiac output, oxygen consumption and oxygen arterio-venous difference, have been anlyzed in each group of cases.

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THE METABOLISM OF METHIONINE AND CHOLINE IN NORMAL AND PRE-ECLAMPTIC PREGNANT WOMEN

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INTRODUCTION

ALTHOUGH a very large number of papers dealing with the relationship of diet to the incidence of pre-eclampsia have been published in the last 20 years, it must be admitted that Theobald's conception of the "toxaemias" as a manifestation of dietary deficiency (Theobald, 1933) is still neither confirmed nor disproved. This view received some support from the controlled investigation of Ebbs, Tisdall, and Scott (1941) and the People's League of Health experiment (1942a, 1942b, 1946), and there is a considerable body of evidence indicating a higher incidence of pre-eclampsia in the poorly nourished groups of women (Arnell *et al.*, 1942, 1945; Baird, 1945; King and Ride, 1945; Tompkins, 1948). On the other hand it is equally true to say that many workers have found a reduced incidence of pre-eclampsia under conditions of great privation, such as existed in certain of the occupied areas during World War II (Mastboom, 1948; van Essen, 1947).

The existence of liver damage in severe pre-eclampsia and eclampsia has been clearly established by liver function tests (Dieckmann, 1941; Laqueur and Ovacik, 1946; Christhilf, Bonsnes, and Barad, 1950) and by numerous histological studies; and it would appear that some degree of impairment of liver function may be demonstrable even in apparently normal pregnancy. The existence of such impairment of liver function is consistent with evidence obtained from plasma protein estimations, which show a decline in the plasma protein levels, affecting principally the albumin fraction (Christensen-Moller and Thygesen, 1946).

The important position in mammalian nutrition of methionine has been established very largely by the researches of Du Vigneaud and his collaborators (Du Vigneaud, 1948). It is now clear that this amino-acid is not only an essential constituent of the tissue proteins, but in the presence of a deficiency of choline and cystine would be called upon by the body to supply methyl groups or sulphydryl groups for the synthesis of these, as well as methyl groups in the synthesis of creatine and other substances such as adrenaline. It might therefore be expected that, in the presence of a generalized protein deficiency, methionine and choline would be key substances, the available amount of which might well determine the degree of impairment of function of those tissues of the body which are specialists in metabolic tasks. Moreover, the experiments of Whipple (1942) show that methionine is of special value in preventing the development of liver necrosis following the ingestion of poisons such as carbon tetra-chloride and chloroform, although it is not yet clear whether this property is related to the metabolic relationships outlined above. In the later months of pregnancy some degree of pro-

tein depletion of the mother might be expected since, in addition to the metabolic demands of the foetus, the maternal organism is undergoing an anabolic process; a situation different from that which obtains in starvation, where adequate amounts of important substances may be made available from tissue breakdown. It would appear therefore that methionine and the metabolically related choline should provide useful indicators of the nature and extent of protein depletion in pregnancy, and it was considered that a study of the metabolism of these substances in pre-eclampsia might make it possible to decide whether a protein deficiency has any aetiological significance in this condition.

In the experiments here described, the blood and urine levels of methionine and choline were measured in normal and pre-eclamptic pregnant women, as well as in a small group of normal, non-pregnant women. These experimental results were interpreted in the light of metabolic studies carried out previously on the rat, and in relation to histological examination of autopsy sections of the liver from "apparently normal" pregnant women (those dying from shock, haemorrhage, and other causes unrelated to pre-eclampsia) and cases of eclampsia.

Experimental Details

Methionine was measured by the standard technique of micro-biological assay using the organism *Leuconostoc mesenteroides* P.60, and a basal medium composed of hydrogen-peroxide-treated peptone with various supplements (Barton-Wright and Curtis, 1948). Blood samples were withdrawn under conditions as near fasting as possible (at mid-day, before the midday meal was served) and placed in tubes containing 12 mg. of potassium oxalate per 10 ml. of blood. After centrifugation and separation of the plasma, this was, for the assay of the free methionine content, diluted 1/3 and freed from protein by heat coagulation at pH 4.7 (Harper, Kinsell, and Barton, 1947). The protein-free filtrate was used for assay after adjustment of the pH to 6.8. The total methionine content of plasma was determined after digestion with 2N hydrochloric acid (5–6 hours at 15 pounds pressure), neutralization and dilution to 1/250. The free methionine daily excretion of humans is very small indeed, and estimations of the free methionine content of urine is difficult even with the degree of sensitivity attainable by micro-biological assays. Normally, urine must be diluted at least 10 times before the various growth-inhibiting factors present cease to affect the assay organism; but in assaying methionine in these experiments, the quantities present were so small that this was not possible, and as a compromise procedure dilutions of each urine of 1/2, 1/4, 1/8 were used. Generally the amount of growth inhibition shown by the 1/4 and 1/8 dilutions was reasonably small, and the values so obtained were accepted. Although the accuracy of the free methionine assays of urine is not high, the values on the whole may be taken as being within 20 per cent of the true figure. The organism *L. mesenteroides* cannot readily utilize methionine present in combination, and small amounts of protein in the urine do not significantly affect the estimation of free methionine. Nevertheless, in cases of heavy proteinuria, de-proteinization (by heat coagulation) was carried out prior to assay. Owing to the fact that bacterial action quickly destroys the free methionine in assay material, such material was preserved in the frozen state (–20° C.) until used. Particular care was necessary with the urine samples which were collected under toluene (10 ml. per Winchester) and removed each day, an aliquot being frozen until the assay was undertaken.

Experiments performed with urine hydrolyzed with 2N sulphuric acid and freed from acid by precipitation with barium hydroxide showed that, so far as methionine is concerned, the result obtained by microbiological assay was very largely an artefact. It was found that the strength of the acid used in the hydrolysis altered considerably the assay figures for the "combined methionine" of the urine, although methionine in aqueous solution was not affected by similar treatment; the recovery of methionine added to the neutralized, hydrolyzed urine preparation gave values considerably greater than 100 per cent, and rats maintained on a methionine-free diet, which were excreting only traces of free methionine, still showed considerable amounts (40–70 micrograms per day) of "combined methionine" in the urine.

Choline was assayed using the choline-less mutant of the mould *Neurospora crassa* following the original technique of Horowitz and Beadle (1943). Assay preparations for plasma were the 1/250 dilutions of the hydrolyzed samples prepared for methionine estimations, and the choline in urine was determined using the hydrolyzed urine preparations. Acid hydrolysis was found to destroy those growth-stimulating substances present in untreated urine which interfere with the quantitative response of the mould to the choline present. The method of preparation of the hydrolyzed urine specimens involved some loss of choline by adsorption on the barium sulphate precipitate and gave results which are approximately 20 per cent too low, but this procedure was found nevertheless to be more reliable than adsorption of permutit. The total α-amino-nitrogen of some of the urine specimens was measured by titration of the carbon dioxide evolved in the reaction with ninhydrin, using the procedure described by Van Slyke, MacFadyen, and Hamilton (1941). Plasma nitrogen estimations were by the standard micro-Kjeldahl technique.

Results

Table I shows the figures obtained for the daily excretion of methionine and choline for a series of cases investigated. The pregnant women showing no evidence

Table I

Mean values for the methionine and choline content of the blood and urine of non-pregnant and pregnant women

(Groups (*b*) and (*c*) were comparable in regard to the duration of pregnancy which varied between 30 weeks and term)

Group	Haemoglobin g. per 100 ml.	Plasma protein g. per 100 ml.	Urine		Plasma		
			Free methionine mg./day	Choline mg./day	Free methionine micro-g./ml.	Choline micro-g./ml.	Methionine N ratio
(*a*) 10 non-pregnant female controls	—	7.01	0.93	4.70	3.44	268	9.11
Standard deviation	—	0.54	0.24	1.03	0.93	56	0.60
(*b*) 26 pregnant women showing no evidence of pre-eclampsia	11.51	6.25	1.88	18.3	3.03	346	10.00
Standard deviation	1.32	0.37	0.84	6.4	0.58	74	0.59
(*c*) 27 pre-eclamptic pregnant women (5 were severe)	11.96	5.98	1.94	18.9	3.22	378	10.13
Standard deviation	1.21	0.40	1.14	11.4	0.66	65	0.72

of pre-eclampsia were admitted to the Simpson Memorial Maternity Pavilion of the Royal Infirmary for reasons which apparently had no relation to the toxaemia of pregnancy; for example, because of a previous Caesarean section, or Rh incompatibility, postmaturity or fibroid uterus, etc. Some of these cases were of rather doubtful normality in relation to their protein metabolism, but this would not appear to be of great significance in view of the results obtained.

The cases of pre-eclampsia varied considerably in the degree of severity of the condition and in their presenting physical signs. To avoid fine distinctions which might have an entirely unreal basis, the cases were divided into two groups, namely, severe, and those remaining. A case was regarded as severe if in addition to oedema it showed a persistent systolic blood-pressure higher than 160 mm. of mercury and marked persistent proteinuria. The remaining cases possessed at least two of the three cardinal signs of the condition, viz., hypertension (systolic blood-pressure greater than 140 mm.), oedema and proteinuria.

The small group of non-pregnant normal women falling within the same age group, which was also investigated, was composed of healthy young women volunteers employed in and about the hospital.

In each case, 2 or 3 complete 24-hour collections were made, and the results of the analyses for each of the collections averaged. There was in general a reasonable agreement between the successive daily output figures, but some cases showed considerable daily variations.

There were no statistically significant differences in any of the figures between the normal pregnant controls and the group of pre-eclamptic cases, but the women who were pregnant differed quite markedly from the non-pregnant women in regard to their excretion of methionine and choline, and of course also in the total choline of the plasma—a result to be expected in view of the known rise in the plasma phospholipids in pregnancy. Table II summarizes the results of the statistical analysis.

TABLE II

Statistical comparison of the results for ***non-pregnant and pregnant women***

Mean values compared	Non-pregnant women	" Normal " plus pre-eclamptic pregnant women	Probability of the difference between the means arising by chance
Mean free methionine excretion (mg. per day)	0.93	1.91	<0.01 ($t=3.2$)
Mean choline excretion (mg. per day)	4.7	18.6	<0.01 ($t=4.0$)
Mean total choline content of plasma micrograms per ml.	268.0	362.0	<0.01 ($t=3.7$)

The plasma protein values show the usual downward trend in the pregnant cases, more particularly in the toxaemic women, but with the limited group here reported the lower values in pre-eclampsia are not statistically significant.

The values for the excretion of choline and methionine show a wide scatter (it is well known that the daily amino-acid excretion shows extremely wide variations between different individuals), but there was no obvious correlation between the values obtained and the degree of severity of the pre-eclampsia. It was of interest to

determine whether the increased choline excretion was combined or phospholipid choline, or free choline. The normal glomerulus is considered impermeable to phospholipids, but experimental evidence is available which indicates that when the glomeruli show the kind of abnormality which permits the passage of protein, they are also permeable to some extent to phospholipids (Eufinger, 1930; Brice, 1930; Page, 1936). The raised choline excretion shown above in the case of apparently normal women, however, showed no constant relationship to the degree of proteinuria (many high values were found in cases showing no detectable protein in the urine) which suggested that the choline measured did not correspond to the lipoid choline referred to by Eufinger. Table III shows the results of analyses carried out on urine specimens extracted with alcohol, ether and petrol-ether, and demonstrates that the choline actually measured was, within the limits of experimental error, free choline.

There is some evidence available from experiments on human subjects that the daily amino-acid excretion is dependent partly on the dietary intake of these substances (Eckhardt and Davidson, 1949; Dunn, Camien, Shankman and Block, 1947; Scheffner, Kirsner, and Palmer, 1948; Frankl and Dunn, 1947), although Eckhardt and Davidson found that a certain level of excretion persisted even on a protein-free regime. Similar results are reported by Borglin (1947) for the excretion of choline by humans. (In the case of the rat, the level of excretion is very considerably determined by the methionine and choline content of the diet (Sims, 1951).) It was therefore necessary to exclude a widely different dietary intake of methionine and choline as a cause of the difference in the excretion per day of the pregnant and non-pregnant women. Table IV shows the result of an approximate survey of the food intake for the two groups using figures for the methionine and choline content of various foodstuffs obtained from the papers of Lyman *et al.* (1946a, 1946b); Horn,

TABLE III

Estimations of choline content of the urine of pregnant women before and after extraction with fat solvents

	Preparation	Without solvent extraction (micrograms of choline per ml.)	Duplicate preparation extracted with fat solvents (micrograms of choline per ml.)
Experiment I	Untreated urine	1.8	3.6
	Untreated urine plus 20 micrograms/ml. of free choline	17.9	15.8
	Untreated urine, 20 micrograms/ml. of phospholipid choline (added blood plasma)	19.0	4.1
	Pregnant urine No. 42	14.8	15.2
	Pregnant urine No. 262	21.7	21.0
Experiment II	Untreated urine	3.6	3.2
	Untreated urine, 20 micrograms/ml. of free choline	20.0	19.3
	Untreated urine, 20 micrograms/ml. of phospholipid choline (added blood plasma)	19.1	3.9
	Pregnant urine No. 58	36	30
	Pregnant urine No. 268	27	25

TABLE IV

Comparison of the average daily methionine and choline intake for the non-pregnant and pregnant groups of women investigated

Group	Methionine mg./day	Choline mg./day
Non-pregnant women employed in and about the hospital and living out	1590	680
Pregnant women, in-patients in the Simpson Memorial Maternity Pavilion	1800	910

Jones, and Blum (1946a, 1946b); Reisen, Schweigert, and Elvehjem (1946); Fletcher, Best, and Solandt (1935); Engel (1943); McIntire, Schweigert, and Elvehjem (1944); Horowitz and Beadle (1943); and Borglin (1947). There is a slightly lower choline intake for the non-pregnant cases (fewer eggs) but the difference is small and could not account for the increased excretion observed in the pregnant state, since many of the pregnant women did not receive while in hospital the egg per day included in the average assessed diet.

In order to eliminate as far as possible the variation from case to case of the excretion pattern, and to study the development during the course of pregnancy of this raised excretion, a number of normal pregnant women were followed to term from a very early stage of pregnancy, and others during the second and third trimesters. These observations were made on women who were carrying out ordinary domestic duties at home. Twenty-four hour urine samples were collected by daily visits during 3-day periods at the several stages of pregnancy, and the results of the analyses averaged to obtain the mean daily excretion at each period. Total α-amino-nitrogen estimations were also done on some of these cases.

Figure 1 shows the results obtained. The records were unfortunately incomplete in a number of cases due to various complications and to the fact that some of the women went into labour before the calculated due date.

The results show clearly that a slight, but detectable rise in the excretion of choline is present even at the 12-week stage of pregnancy, and that the daily excretion of this substance continues to increase until term. In the case of methionine, although the rise in excretion is hardly detectable at the 12-week stage, it is clearly apparent at 26 weeks. In the last trimester, however,

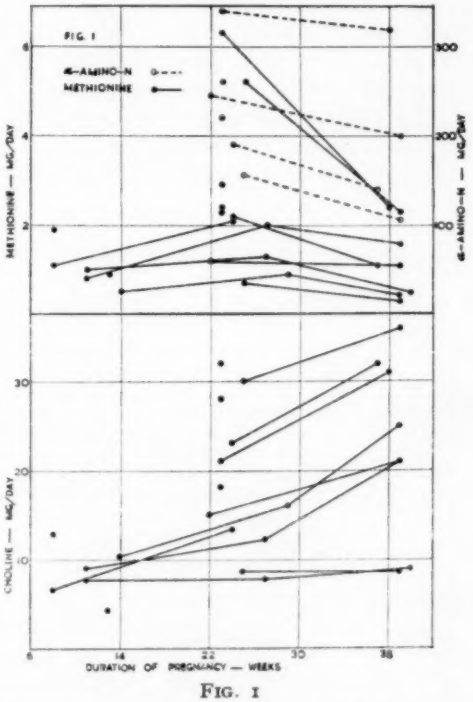

FIG. 1

The daily excretion of methionine and choline at different stages throughout pregnancy.

there is a reduction in the daily excretion of this substance which is proportionately greater than the reduced total amino values found for the same urine specimen, and undoubtedly associated with the well-known nitrogen retention which occurs in the later months of pregnancy. This result would seem to indicate a specially increased demand for methionine towards the end of pregnancy although the continued rise in choline excretion suggests that no severe shortage of labile-methyl groups exists at this time. These women were questioned about their food intake and were eating essentially the same diet in the last few weeks of term as they did earlier.

Discussion

The raised excretion of methionine and choline characteristic of the pregnant state is the most striking feature of the biochemical findings recorded above, and it is of interest to discuss the possible reasons for this phenomenon.

Voge (1929) and the extensive studies of Kapeller-Adler (1941), using a modification of Knoop's bromination reaction, have established a raised excretion of histidine in normal pregnancy, and Lawrie (1947), studying tyrosine by a method involving the use of tyrosinase, has demonstrated the same effect for this substance, suggesting at the same time the possibility that similar findings would be obtained with other amino acids. A recent paper by Wallraff, Brodie, and Borden (1950) shows that, in the case of 7 out of 14 amino acids examined by the microbiological method, there was a significantly increased excretion in the pregnant state. In addition to the findings here recorded for methionine, the small number of estimations of total α-amino-nitrogen also made give a level of free amino-acid excretion in most cases above that characteristic of the non-pregnant individual. It would therefore appear that the raised excretion in normal pregnancy is the result of a generalized physiological change, not affecting any individual amino-acid specifically.

The renal clearance of a number of amino-acids has been investigated, and that of methionine and histidine among others was studied by Wright *et al* (1947) in the dog. These workers found that at plasma levels of 10 and 50 times that of the post-absorptive state, re-absorption of methionine and histidine was practically complete, thus indicating that the small amounts of these substances found normally in the urine are due to the escape of minute quantities from re-absorption. This work confirms the earlier findings of Doty (1941) on histidine and tyrosine.

It was suggested by Page (1946) that the raised excretion was due to a diminished power of tubular re-absorption in pregnancy, and in the light of the observations recorded in this paper, this would seem to be the most reasonable view. Substances, of such widely divergent chemical properties as amino-acids, choline, glucose, and ketone bodes are found in the urine in increasing amounts in the later months of pregnancy, and it is well known that the ability of the kidneys of the normal pregnant woman to concentrate urea and sodium chloride and to excrete urine of high specific gravity is significantly reduced. This suggestion that diminished tubular re-absorption is the cause of the histidinuria observed in pregnancy has been challenged by Kapeller-Adler (1949) on the basis of experiments on pregnant women involving the intravenous or oral administration of a measured dose of this amino-acid. The results which appear in her paper, however, favour rather than contest Page's view of the mechanism of excretion in the normal pregnant woman. Referring to Figures 1 and 2, it is clear that within the first 30 minutes after intra-

venous injection of histidine, the mean blood concentration of this amino-acid is roughly the same for both non-pregnant and pregnant women, yet within this same period there is considerable difference in their excretion, that of the pregnant women being some 10 times greater. The same phenomenon is even more strikingly demonstrated by the results of oral ingestion (Figs. 5 and 6). The delayed metabolism of intravenously or orally administered L-histidine in the pregnant woman, and the reduced excretion of histidine by the toxaemic groups are observations of great interest, and no explanations other than those advanced by Kapeller-Adler have as yet been suggested. Although the toxaemic pregnant cases quoted by Lawrie (1947) are few in number, his figures suggest that there is a reduction in the excretion of tyrosine also in pre-eclampsia. No significant fall was observed in the methionine excretion in pre-eclamptic women in the experiments here described, but methionine excretion is at all times of such a low value that none but gross alterations could be detected under the experimental conditions obtaining in this series. It is of interest to note in this connexion that there is a reduction in the excretion of prenanediol, and also of oestrogens in pre-eclampsia.

If, as Kapeller-Adler (1949) suggests, this reduction in excretion is due to renal failure, it must be a kind of failure which is highly specific in nature, for, as shown above, choline is excreted as freely by the pre-eclamptic woman as by the normally pregnant one. Only a very slight reduction can be demonstrated in the excretion of urea (Hurwitz and Ohler, 1932; Elden, Sinclair and Rogers, 1936), inulin, diodrast (Kariher and George, 1943), and only a moderate loss of excretory power in the case of uric acid (Chesley, 1950).

As a result of experimental investigations, recorded as yet in the form of preliminary reports (Mote, 1950; Sprague, Power, and Mason, 1950), it must now be regarded as almost certain that the physiological changes which cause the increased excretion of amino-acids and other substances by the normal pregnant woman are consequences of the increased production of adrenal cortical hormones which accompanies the pregnant state. The administration of A.C.T.H. (and cortisone) to the non-pregnant individual, in amounts similar to those formed by the body in pregnancy, produces glycosuria, a reduced glucose tolerance as shown by blood sugar curves, ketonuria, an increased excretion of amino-acids, and a retention in some cases of salt and water comparable with the findings in pregnant women (Dieckman *et al.*, 1950).

This peculiarity of the kidney of the pregnant woman is a factor which must be considered in the interpretation of variations in the excretion of certain hormones during the course of pregnancy, e.g., adrenal cortical hormones, oestrogens, pregnanediol. It is a change which apparently does not occur in animals (Kapeller-Adler and Herrmann, 1934; Sims, 1951).

The essential equivalence of the daily excretion of methionine and choline in normal and toxaemic cases, and the fact that the excretion of these substances is not significantly lower in the case of the more severe pre-eclamptic woman would seem to indicate that a specific shortage of this kind is not an important factor in the aetiology of pre-eclampsia, although, as Figure 1 shows, there is some evidence of a special conservation of methionine by the maternal organism in the later months of normal pregnancy. It has already been pointed out that the level of excretion of methionine (as with other amino-acids) and choline is considerably affected by the

dietary intake of these substances. The fact therefore that equal amounts are excreted by both toxaemic pregnant and normal pregnant women is not necessarily an indication of anything more than an equivalence of the intake. Nevertheless it would appear likely from animal experiments (Sims, 1951) and from excretion studies in humans (Eckhardt and Davidson, 1949; Borglin, 1947) that a reduced methionine and choline excretion would very likely occur in the presence of a severe depletion. This view is supported by the findings recorded in Figure 1 in which the patients concerned had substantially the same dietary intake throughout the period of the investigation. The reduction in the methionine excretion of these cases in the later months of pregnancy compared with the total excretion of α-amino acids would seem to imply some degree of depletion of the body in regard to this amino-acid, but a depletion of insufficient severity to give rise to demonstrable pathological lesions.

This interpretation of the experimental findings is supported by histological studies (in preparation for publication) of the liver lesions in sections from autopsies carried out on cases of eclampsia, and on pregnant women who have died from causes apparently unrelated to pre-eclampsia e.g. postpartum haemorrhage, obstetric shock, etc.). In laboratory experiments, particularly in the case of the rat, the liver sections of animals suffering from a deficiency of whole protein or of an essential amino-acid such as methionine, show an appearance of generalized rarefaction of the cytoplasm of the liver cells, with prominence of the cell membranes—a change shown by Kosterlitz (1947) to be due to a mobilization of the cell protein. Although, in the autopsy material studied, examples of this type of change were found in some cases of eclampsia, it was not present in proportion to the severity of the liver damage otherwise apparent, and the typically portal distribution of the necrosis and liver cell absorption in the human material did not resemble in any respect the diffuse liver-cell involvement seen in the rat.

Fatty infiltration of the liver cells in more than trifling amounts was not seen in any of the sections of the human cases, evidence which would therefore make the existence of a significant degree of choline deficiency unlikely.

If a maternal depletion of methionine in the later months of pregnancy is not of sufficient degree to be considered a likely aetiological factor in pre-eclampsia, it would seem also to be a reasonable inference that a general protein deficiency is similarly unlikely to be an important factor in precipitating this condition, although it may well, of course, play a part in aggravating the disorder.

This general conclusion would appear to receive some support from the rather conflicting information available from therapeutic trials. Thus Golden and Fraser (1947) report the treatment of 5 cases of severe pre-eclampsia and eclampsia with twice concentrated plasma as well as other supportive treatment, and all are reported to have recovered. Less favourable was the experience of MacArthur (1948) who found no improvement from protein hydrolysate given by mouth and parenterally, but methionine, administered to one patient with severe pre-eclampsia, was stated to have produced a rapid improvement in the clinical condition, and a rise in the plasma protein level. Philpott, Hendelman, and Primrose (1949) gave methionine for a period of 1 to 4 weeks, to 8 pre-eclamptic patients and were of the opinion that the results were promising but not conclusive.

SUMMARY

1. In an attempt to gain information about the dietary deficiency theory of the aetiology of pre-eclampsia so far as it related to the protein portion of the diet, the metabolism of methionine and choline was studied in normal and pre-eclamptic pregnant women.

2. There was no significant difference between the methionine and choline excretion of 26 normal pregnant women and 27 toxaemic pregnant women, although all the pregnant cases showed a significantly higher excretion than a control group of 10 non-pregnant women of essentially the same age and dietary intake.

3. The raised excretion characteristic of the pregnant state is detectable by the end of the first trimester, and in the case of choline rises steadily until parturition. With methionine there is a falling off in the last trimester, probably due to some degree of methionine depletion of the maternal organism at this time.

4. Recent studies on the physiological effects of raised adrenal cortical activity indicate that the raised methionine excretion in pregnancy as well as other manifestations such as the glycosuria, the tendency towards ketonuria, salt and water retention, etc., may well be explained in terms of the known rise in the production of adrenal cortical hormones associated with the pregnant state.

5. On the basis of the biochemical studies, and certain histological observations, it is concluded that the balance of evidence is against a specific methionine-choline deficiency as an important aetiological factor in pre-eclampsia, and the same evidence likewise speaks against the existence of a generalized protein deficiency in this connexion—although such a deficiency could well be an aggravating factor.

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DIABETES AND PREGNANCY

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THE combination of diabetes and pregnancy was seldom seen before the discovery of insulin. In the older literature it is stated that only 5 per cent of women with diabetes become pregnant. One of the accepted explanations of this has been, that, with a long duration of the disease, regressive changes occur in the ovaries which often lead to amenorrhoea. Other factors may also have played a role. Quite often in non-treated diabetics infections of the vulva, the vagina and the uterus develop, by which the normal chemical state of the vaginal contents and of the cervical mucus may be disturbed. After the discovery of insulin, the frequency of pregnancy with diabetics increased markedly. At present a well-balanced diabetic shows the same fertility as a normal woman (Paton, 1948). Furthermore, many young girls with diabetes now reach maturity, which was previously not the case.

The influence of insulin therapy is also shown by the fact that in the United States of America the frequency of pregnancy in the white diabetic is recorded as twice as high as in the negroes, notwithstanding the fact that diabetes is more common in the negro population. The negroes in general receive poorer diabetic treatment (Rike and Fawcett, 1948).

The incidence in our clinic from 1st September, 1938, to 1st January, 1951, is as follows: of 21,786 admissions, 79 diabetic women had 95 pregnancies. The frequency is thus 0.44 per cent of the number admitted. This figure does not vary greatly from that given in recent papers (Gilbert and Dunlop, 1949).

Before proceeding further with the problem, a few words must be said about diagnosis. In a normal pregnancy, a reduction in the urine is often found. At the end of the pregnancy and in the puerperium this may be a lactosuria. A glycosuria in pregnancy may be caused by a lowered renal threshold, which is often seen in pregnancy. In order to make the diagnosis of diabetes in cases with glycosuria, a fasting blood sugar and a blood sugar curve are necessary. Even then one must be prudent. In clinically healthy pregnant women the tolerance for sugar may be decreased, causing a change in the blood sugar curve. In some of these cases it may be difficult to say whether the patient should be classified as diabetic or not. All

cases in our series were diagnosed by an internist (Professor Dr. G. A. Lindeboom).

Our cases are classified as follows:

In 20 pregnancies diabetes was severe (more than 50–60 U. insulin)

In 20 pregnancies diabetes was moderate (between 20 and 60 U. insulin)

In 25 pregnancies diabetes was mild (less than 20 U. insulin)

In 30 pregnancies diabetes was subclinical.

In the group of subclinical diabetics were included the patients who had no complaints, but where an examination of the bloodsugar, performed because of a reduction in the urine, or because of pregnancy symptoms, revealed a diabetes. We fully realize that this classification is only an arbitrary one, because the amount of insulin needed depends for the greater part on the diet prescribed. We only give this classification to give some impression of the severity of the cases. In most papers on this subject information on this point is entirely lacking, thereby making comparison of results impossible.

No cases with glycosuria showing a normal sugar tolerance test were included. In some cases symptoms of diabetes existed without reduction in the urine, but with a blood sugar curve showing decreased sugar tolerance. Evidently a raised renal threshold prevents glycosuria in such cases.

Influence of Pregnancy on Diabetes

This influence may vary greatly in different individuals. In some cases the influence is barely noticeable: the same diet and the same quantity of insulin are used throughout pregnancy. In most cases the condition deteriorates so that the quantity of insulin must be increased. The improvement towards the end of pregnancy, reported in older papers on this subject (Holzbach, 1929), probably occurs only in a few cases.

The cause for the increased severity of diabetes in pregnancy is not as yet definitely known. It is occasionally suggested that the pancreas under the influence of pregnancy is under a greater strain, although it is not made clear what this exactly means. A hyperfunction of the anterior lobe of the hypophysis, which is always hypertrophic in pregnancy, must be considered the most probable explanation for the deterioration of the patient's condition.

If the patient is not under proper treatment there is great danger for the development of diabetic coma, particularly during labour. This is partly due to the tendency towards acidosis in every pregnant woman. Intra-uterine foetal death may be caused by a severe acidosis which need not give any clinical signs until coma develops. Severe vomiting of pregnancy, by which unknown quantities of carbohydrates are lost, may cause a severe acidosis and make a control of the diabetes nearly impossible. After labour the sugar tolerance may increase so suddenly that there is great danger of hypoglycaemia (Bigby and Jones, 1945).

As diet and insulin requirement were in former years not always clearly stated in our case records this information is incomplete. There was one case of diabetic coma in a non-treated woman in our series.

1-para, 29 years old, came to our out-patient clinic for prenatal care with a pregnancy of 27 weeks. Except for a delayed reduction in the urine, no abnormalities were discovered. The woman was given an appointment for further examination. Before a sugar tolerance test could be made, however, she was admitted to our clinic in diabetic coma. There was a severe acidosis (alkali reserve 10.9 vol. per cent). Foetal heartbeats were absent. The patient was transferred to the medical clinic where she died after 2 days.

This case history shows clearly the necessity for a rapid and complete examination even if only a delayed reduction is found in the urine and demonstrates the sudden and

unexpected deterioration that can occur in a pregnant woman with unrecognized diabetes.

In one case a pre-coma developed in a patient who was not under our medical supervision.

4-para, 36 years old, was, previous to the pregnancy, under the care of her own internist for diabetes. She came to our out-patient clinic for prenatal care when 27 weeks pregnant. Because the patient was already being treated by an internist, further control of the diabetes was entrusted to him. When 28 weeks pregnant she was admitted in a pre-comatose state. There was a severe acidosis and the foetus was dead. With medical therapy the patient recovered and some time afterwards a macerated foetus of 1 pound 9 ounces (725 g.) was born.

Several other women demonstrated a deterioration of disease during pregnancy which could be controlled by increasing the amount of insulin. In no case was a definite improvement observed.

In our series 51 women received insulin in 60 pregnancies. In 12 cases symptoms of hypoglycaemia developed in the puerperium. Most of the patients who received insulin during pregnancy needed less or no insulin after delivery.

Maternal mortality, which was reported to be 30–50 per cent in the years before the inauguration of insulin therapy, has in later years improved considerably. At present hardly any mortality is connected with the diabetes of pregnant women. The only fatal case in our series, already mentioned above, could have been prevented if the diagnosis had been made before or earlier in pregnancy.

Influence of Diabetes on Pregnancy

Diabetes is said to cause abortion, especially missed abortions, miscarriage and premature delivery. As to the frequency of abortion which, according to more recent publications, seems to be only slightly increased in the well-treated diabetic (Barns and Morgans, 1949), we could form no personal opinion since our records only included pregnancies with a viable child. The great frequency of premature delivery was confirmed by our series. In 95 observed pregnancies, 2 patients refused further treatment and left the clinic before delivery. One patient died undelivered. The remaining 92 deliveries were:

Premature	spontaneous ...	30 (32 infants)	(36 per cent)
	artificial ...	3	
At term		47	(51 per cent)
Postmature		12	(13 per cent)

The influence of prematurity on the infant mortality will be discussed later.

Complications of pregnancy occurring frequently in diabetic women are toxaemia of pregnancy and hydramnios (White, 1935, 1945; White and Hunt, 1940; Pease *et al.*, 1951; Peel and Oakley, 1949).

In our series toxaemia of pregnancy occurred in 19 cases (20 per cent). This is exactly twice the estimated frequency of toxaemia in our country. We do not think that it is of any use to compare our frequency percentage with that of others, because all depends on what is included under the diagnosis toxaemia.

We believe that the toxaemia of pregnancy is caused by an insufficient blood supply to the placenta. In diabetic women this blood supply can be diminished absolutely or relatively because:

1. The arteries in diabetic women may show arteriosclerotic changes. These

changes in the uterine artery will prevent a dilatation in pregnancy. (The average age in our diabetic series was 32 years against 28 years in a series of non-diabetic women from our clinic.)

2. A hydramnios will constrict the uterine vessels by stretching the uterine wall.

3. The child and the placenta are often larger than normal. ten Berge and van Assen (1947) found that in diabetic women with toxaemia the placenta is on the average much larger than in diabetes without toxaemia.

there is no doubt as to the increased frequency of hydramnios in the diabetic, we cannot agree with the common belief expressed for instance by Peel and Oakley (1949) that hydramnios is a common complication.

Given *et al.* (1950) found only 2 cases of hydramnios in 116 diabetic pregnancies with a viable child.

A large amount of amniotic fluid was often found in pregnancies with a large child, but no relation could be found between the amount of amniotic fluid and the severity of the diabetes. This is shown in the following table:

Hydramnios		Much Amniotic Fluid	
Severity of diabetes	Weight of child (grams)	Severity of diabetes	Weight of child (grams)
mild	4830	severe	3060 (premature)
moderate	4310	mild	4860
moderate	4500	mild	2780
mild	3570 (congenital malformation)	mild	5000
		mild	4620 (premature!)
		mild	3820
		mild	4770 (premature!)
		moderate	4410
		severe	4400 (congenital malformation)
		mild	3680

These factors can easily explain the doubled frequency of toxaemia in our pregnant diabetics.

Hydramnios was found in 4 cases. In 10 other cases a large amount of amniotic fluid was noted in the records, without a definite confirmation of the diagnosis. Although

Of 9 children weighing 10 pounds (4,500 g.) or more, 6 were in the group with hydramnios or much amniotic fluid. This brings us to another influence of the diabetes on the pregnancy, the overdevelopment of the infant. This well-known influence was also seen in our patients.

	Weight variation	Average weight	(Normal average)
Premature children	725–4770 g.	2600 g.	(1936 g.)
Full-time children	2400–4860 g.	3660 g.	(3315 g.)
Postmature children	2900–5550 g.	4085 g.	(?)

The large child of the diabetic mother is not only heavy, but shows an actual overdevelopment which cannot be explained solely by the extra amount of glucose received from the mother. This is also demonstrated in those cases where the maternal diabetes is well controlled and nevertheless a very large child is born. Two such cases not included in this series were recently seen in our clinic. It is also known that many infants are born many years before the diabetes has developed (Paton, 1948). Probably the previously mentioned hyperfunction of the anterior lobe of the hypophysis is in some way connected with the overdevelopment of the foetus. Too much growth hormone (Young, 1941) could possibly be the explanation (Barns and Morgans, 1949). No relationship was found between infant weight and severity of the diabetes.

The most important complication of diabetes in pregnancy is intra-uterine death of the foetus. Before insulin was used foetal mortality was reported to be more than 50 per cent. After the inauguration of insulin therapy foetal mortality decreased, but not nearly so much as the maternal mortality.

After eliminating 2 patients who refused treatment, there were in our clinic 93 pregnancies with 95 viable infants (2 twins). Of these 95 children, 20 died, a mortality rate of 21 per cent. In 3 cases death could not be attributed to the diabetes. One child died due to a placenta praevia and 2 others following early rupture of the membranes. Four children died from serious congenital abnormalities. We do not wish to exclude these cases as it is possible that the congenital defects are caused by the diabetes. Our corrected mortality in 7 cases = 17.8 per cent.

The duration of pregnancy seems to be an important factor in the final outcome for the infant, delivery at term giving by far the lowest mortality. This is shown in the following table:

		Mortality rate
Of 35 premature children	12 died	34 per cent
Of 47 full-time children	4 died	8.5 per cent
Of 12 postmature children	3 died	25 per cent

Although the mortality rate is greatest among the prematures, the probable cause of death was prematurity in only 4 cases. In 4 other cases intra-uterine death of the foetus preceded the onset of labour.

The importance of the severity of the diabetes for the child is seen in the next table:

Severe diabetes	:	19 children,	8 died (1 death not related to diabetes)
Moderate diabetes	:	20 children,	5 died
Mild diabetes	:	26 children,	3 died
Subclinical diabetes	:	30 children,	4 died (2 deaths not related to diabetes)

Although our series is too small to make definite conclusions, it seems likely that there is a direct relationship between severity of the diabetes and infant mortality.

Pregnancies preceding the onset of Diabetes

Several authors have pointed out that complications seen in the pregnant diabetic are already present many years preceding the onset of the diabetes (Barns and Morgans, 1948; Paton, 1948; Peel and Oakley, 1949; Gilbert and Dunlop, 1949). It is said that the number of abortions is high, that foetal mortality is increased and that increased weight of the infant is a

common occurrence in the pre-diabetic years. This was confirmed in our material. Seventeen of the women in our series were primiparae, the remaining 62 had had 226 pregnancies previously to the pregnancies analyzed above. In 5 of these pregnancies diabetes already existed. In 221 pregnancies of 62 women, diabetes did not yet exist or was at all events not yet recognized. The course of these so-called pre-diabetic pregnancies was as follows:

Abortion or immature birth...	55	= 25 per cent
Premature birth	21	= 9.5 per cent
Full-time delivery	138	= 62.4 per cent
Postmature birth	7	= 3.2 per cent

Although it is difficult to say what is the normal frequency of abortion, we feel that 25 per cent is a high frequency.

In 166 pregnancies with a viable child, 168 children were born; of these 28 were stillborn or died in the first week of life.

Premature children	22	11 died	(50 per cent)
Full-time children	139	14 died	(10 per cent)
Postmature children	7	3 died	(—)
All viable children	168	28 died	(16.6 per cent)
Non-viable children	55	55 died	
Total foetal loss		83	(37.2 per cent)

The increase of birth weight in pre-diabetic years was also clearly demonstrated in our material. The average infant weight in these years is even higher than in the years of the fully developed diabetes. Detailed information upon this point will be given later.

Treatment of Diabetes in Pregnancy

The factors which are probably most deleterious, both for mother and child, are hypoglycaemia and acidosis. Before the time of insulin the object was to lower the blood sugar level by giving a diet with little carbohydrate, much protein and fat. Such a diet necessarily gave poor results as it increased the acidosis especially in the pregnant woman. In 1932, van Bouwdyk Bastiaanse pointed out that pregnant diabetics must be treated with a diet rich in carbohydrates, adding as much insulin as was necessary to maintain a normal blood sugar level. Until recently this treatment was often very difficult because many internists did not agree with this therapy. At present there is hardly any difference of opinion on this point. An amount of 200 g. (White, 1945; Allweis, 1950) or even 200 to 300 g. (Bigby and Jones, 1945) must be given to prevent acidosis. The amount of fat must be restricted for the same reason and because many of our diabetics are overweight.

The amount of insulin necessary should not be estimated according to the quantity of sugar excreted in the urine, but according to the blood sugar level. A change in the renal threshold in both directions can further complicate the situation. All these problems cannot be managed by the obstetrician alone, and every pregnant diabetic must be under the careful supervision of an internist as well.

Particularly difficult is the balancing of the diabetic woman in the early puerperium. In most cases there is an immediate increase in carbohydrate tolerance. This occurs to such a degree that hypoglycaemic symptoms are frequently seen. As already stated, in our patients this occurred in 20 per cent of the patients receiving insulin.

Other possible therapeutic measures are the administration of large quantities of hormones (White, 1940) or synthetic oestrogen (White, 1945), and the termination of pregnancy about the 37th week, preferably by means of a Caesarean section. The

literature at the present moment is far from unanimous on both these subjects. As we are unable to do routine hormone excretion determinations, we could form no personal opinion on the importance of hormonal imbalance in the pregnant diabetic.

As Sindram (1951) has discussed elsewhere, our material did not demonstrate that premature termination of the pregnancy would improve our results. Although we are convinced that a Caesarean section is more frequently indicated in the diabetic woman (large child, postmaturity, toxaemia), we do not see any reason for a routine Caesarean in the 37th week.

If we take good care of the diabetes, the pregnancy will take care of itself.

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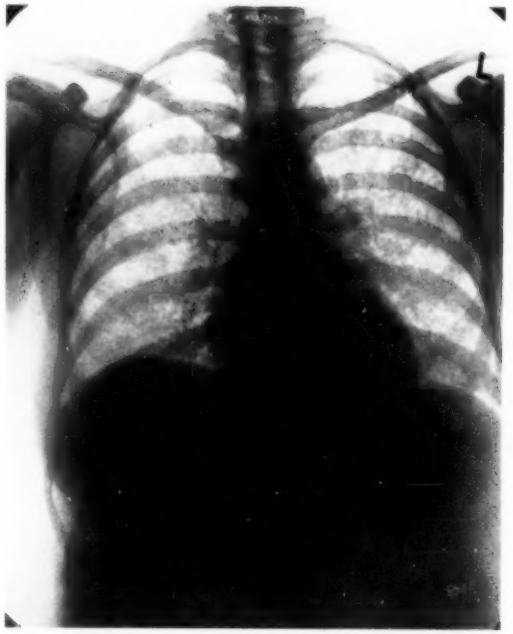

FIG. 1

The chest on 31st July, 1950, showing acute miliary tuberculosis.

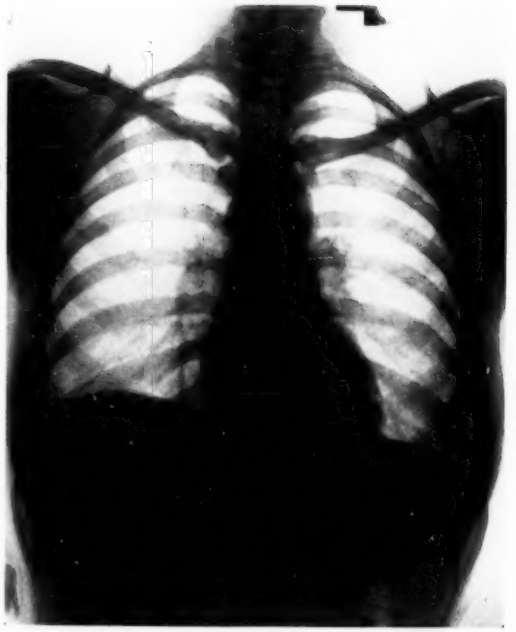

FIG. 2

The chest on 2nd February, 1951, showing the clearing of the lung fields.

A.L.G.

A CASE OF ACUTE MILIARY TUBERCULOSIS WITH MENINGITIS DURING PREGNANCY TREATED WITH STREPTOMYCIN AND SODIUM PARA-AMINO-SALICYLATE (P.A.S.)

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So few cases have been recorded of acute miliary tuberculosis treated during pregnancy with streptomycin that it seems well worth while to give a detailed account of a case that has been treated successfully, but with death of the foetus, and to consider why the foetus died.

CASE REPORT

Emily R., aged 37, had no family history of tuberculosis but she had had pneumonia at the age of 21. She had had 3 normal confinements, 10, 7 and 6 years previously. Her last menstrual period started on 11th April, 1950. In mid-June she began to complain of malaise, headache, poor appetite, loss of weight and cough with scanty sputum. On 31st July, 1950, she was admitted to the Royal Sussex County Hospital with marked breathlessness, and X-ray films of her chest showed extensive miliary tuberculosis of the lungs. The blood showed hypochromic anaemia, the haemoglobin was estimated to be 67 per cent normal (10 g.) and the white cell count was 10,400 per c.mm. The cerebro-spinal fluid on 2nd August, 1950, contained sugar 25 mg. per 100 ml.; cells, all lymphocytes, 13 per c.mm.; and chlorides 680 mg. per 100 ml.; but tubercle bacilli were not found. Next day the sugar had decreased to 12 mg. per 100 ml.

On 2nd August, 1950, it was evident that the patient was also developing tuberculous meningitis. Treatment was begun with intramuscular injections of streptomycin 2 g. daily, and sodium para-amino-salicylate 12 g. daily given by mouth. Intrathecal administration of streptomycin was started on 3rd August; and on the following day the patient was transferred to Grove Park Hospital, and came under our care.

She was found to be in poor condition, thin and breathless on making quite small movements. She displayed faint cyanosis, early finger clubbing and definite neck rigidity, and there were numerous fine moist râles at both lung bases. The signs of pregnancy were present and the size of the uterus coincided with 16 weeks' amenorrhoea. It had been suggested that the pregnancy should be terminated but we decided that this would be harmful.

The patient remained very ill with her temperature swinging up to 102–103°F. for the next 4 weeks. She first felt foetal movements on 13th August, 1950 (18 weeks). On this date the liver was found to be enlarged ("4 fingers") and was then soft; but later it became firm and smooth. The spleen was also just palpable. On 16th August, 1950, she began to get reactions apparently following the intrathecal injections of streptomycin, and these became a marked feature of the case. They thus

started after about 14 days' treatment and culminated in the most severe reaction about 22 days after. They continued to occur, although less severely, when the intrathecal injections were given even as late as 61 days after the beginning of treatment. These reactions, which seemed to be less marked with 50 mg. than with 75–100 mg., consisted of vomiting, giddiness, blurring of vision, severe headaches, pyrexia up to 103°F., rigidity, opisthotonus, jerking of the limbs and, on one occasion, coma with cyanosis lasting over 12 hours and accompanied by temporary right spastic hemiparesis. At the time of these reactions there was a marked increase of cells in the cerebro-spinal fluid, up to 1,000 per c.mm. with 80 per cent or more of polymorphonuclear leucocytes, and increase in the protein up to 120 mg. per 100 ml. Chlorides were decreased to 640 mg. per 100 ml., but the sugar content was now normal.

The temperature began slowly to settle to normal after about 11 weeks treatment and her general condition gradually improved. Four blood transfusions were given during these weeks for hypochromic anaemia, the haemoglobin having fallen on one occasion to 55 per cent normal (8.3 g.).

The patient did not feel foetal movements after 24th August, 1950. On 8th September, the uterus appeared to be smaller and the foetus was presumed to be dead. On the following days there were several small blood shows. On 11th October, 1950, a course of stilboestrol was given, 10 mg. hourly for 10 doses, and this was repeated next day. It was tolerated perfectly but abortion did not occur and so 11 days later another similar 10 doses were given. Next day the membranes ruptured. Nothing else happened and so 14 days later a further course of stilboestrol, 10 mg. half-hourly for 20 doses, was given. After another 4 days, on 9th November, 1950, a macerated foetus was expelled with the loss of 13 ounces of blood. The placenta did not follow and so next day it was removed with the finger and ovum forceps without anaesthesia. About 10 ounces more blood were lost.

From then on the patient's condition improved steadily. She rapidly recovered from an attack of influenzal bronchitis in January 1951. The liver became smaller and by 19th January, 1951, it was no longer palpable. By 31st January, 1951, she seemed well and she could walk unaided although she still felt somewhat giddy. She had marked nerve deafness, but mentally she was cheerful and alert. The haemoglobin was then 82 per cent normal (12.3 g.). The cerebrospinal fluid on 7th February, 1951, contained no cells, protein measured 60 mg. per 100 ml., chlorides 730 mg. per 100 ml., and sugar 53 mg. per 100 ml. Tubercle bacilli were not found in the cerebrospinal fluid or in the sputum at any time. Acid-alcohol-fast bacilli resembling M. tuberculosis were found in the vaginal discharge on 2 occasions within 3 weeks of the onset of the illness but cultures were sterile. On 3rd February, 1951, X-ray films showed remarkable clearing of both lung fields, but not quite complete and with a small rounded focus in the right mid-zone.

On 3rd September, 1951, 13 months after she first came under treatment, the patient was remarkably well. She weighed 9 stone 6 pounds, which was a gain of 13 pounds in the preceding 6 months and 10 pounds more than her previous maximum weight, she had no cough or expectoration; and she was able to live a normal life except for severe deafness and difficulty in balancing in the dark. The blood haemoglobin was estimated to be 88 per cent normal (13.2 g.). The urine showed no abnormal constituent, and cultures on Lowenstein Jensen medium made for 42 days gave no growth of tubercle bacilli. The menstrual function had been quite regular since December 1950, and libido was normal. Apart from some laxity of the pelvic floor and a medium laceration of each side of the cervix with some ectropion, the pelvic organs were normal. There was not any evidence of tubal infection, and endrometrial biopsy showed a normal premenstrual phase without any evidence of tuberculous infection.

Dr. A. Macfarlane reported that successive X-ray films failed to show any signs of re-activation in the lungs.

The foetus had almost certainly been dead in utero for 10 weeks. It was macerated and discoloured but, although it was examined carefully, there was not any macroscopic evidence of tuberculosis.

The placenta was cut into strips one-eighth inch (0.3 cm.) wide but macroscopic evidence of tuberculosis was not found. Tuberculous changes could not be found in the 3 areas which were sectioned for microscopic examination.

Summary of Treatment

Intramuscular Streptomycin. 2 g. of dihydrosteptomycin sulphate were given daily for 16 days, then 3 g. daily for 26 days, then 2 g. daily for 5 days, 1 g. daily for 80 days, 1 g. on alternate days for 18 days and, finally, 1 g. every 3 days for 37 days. A total of 221 g. of dihydrostreptomycin sulphate was given intramuscularly in 182 days.

Intrathecal Streptomycin. 100 mg. of dihydrostreptomycin sulphate were given daily for 14 days, then 4 days' rest, then 100 mg. daily for a further 12 days (on 3 days the administration was omitted because the reaction on the previous day was very marked), then 50 to 75 mg. on alternate days for 14 days. Total 31 doses, comprising 2,525 mg.

Sodium para-amino-salicylate as a 20 per cent solution was given containing 3 g. of the drug 4 times a day throughout the whole period, i.e., 12 g. daily for 182 days.

Discussion

Thus acute miliary tuberculosis started at 16 weeks of pregnancy when treatment with streptomycin was begun. The foetus apparently died at about 20 weeks, i.e., after 4 weeks of fever, during which the patient was seriously ill and had had some severe reactions to intrathecal streptomycin. The approximate dosage of streptomycin given to the mother in this period was 63 g. in 3½ weeks.

Lundström (1947) collected all the published cases of miliary tuberculosis in association with pregnancy and the puerperium, and the total was 72. All the patients died.

Acute miliary tuberculosis was formerly considered to be invariably fatal. We can find only 1 other recorded case of miliary tuberculosis and meningitis occurring in pregnancy and treated with streptomycin. This was described by Rogers, Wilson and Goodier (1950); acute miliary tuberculosis and meningitis developed at 32 weeks of pregnancy. The patient was treated with streptomycin without P.A.S. for 4½ months, and after fever of 97–102°F. had persisted for 3 weeks she began to improve; but although the delivery was normal and the child healthy, the mother's condition was never completely controlled, and she died within 3 months of parturition. There are several differences between our case and that of Rogers, Wilson and Goodier. We gave streptomycin for a shorter period, but gave P.A.S. simultaneously. P.A.S. has been shown to delay the development of resistance of tubercle bacilli to streptomycin (Medical Research Council, 1950) and so may have made all the difference to our patient. In the case of Rogers, Wilson and Goodier the tubercle bacilli became 32 times more resistant to streptomycin than a control strain, and the patient died. In addition P.A.S. has a definite tuberculostatic action (Lehmann, 1946). Their patient had to undergo the puerperium while the meningitis was still active. In our experience the puerperium is the great testing time for the tuberculous. It may be relevant in this connexion to point out that although in our case the foetus died early in pregnancy, it was not passed until the patient had been apyrexial for 5 weeks, and 11 weeks after foetal death had occurred. It is noteworthy that at the time of the intra-uterine death, the maternal condition was very much worse and remained so for a further 2 weeks. It should be emphasized that our patient passed into a desperate condition, stuporous or comatose for several days and that great determination was needed to continue the treatment.

There would seem to be five possible causes of foetal death, tuberculous infection, tuberculous toxaemia, pyrexia, streptomycin and P.A.S. The organs of the foetus did not show any naked eye evidence of tuberculosis; but it was macerated and search for microscopical evidence was not made. On the other hand the placenta was

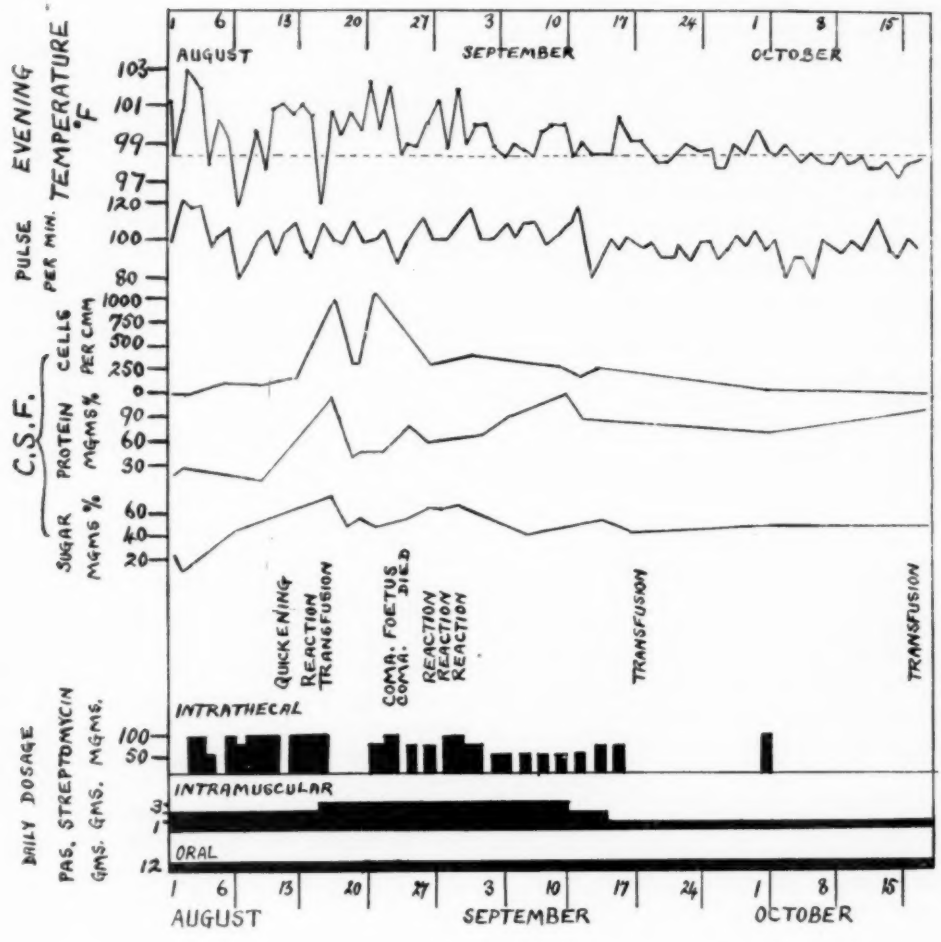

FIG. 3

Chart showing temperature, pulse rate, cerebrospinal fluid changes and daily dosage of streptomycin and P.A.S. during the first 11 weeks of treatment.

suitable for microscopical examination, but here again tuberculosis was not discovered, nor was there any other abnormality. However, the work of Schmorl and Geipel (1904) should be remembered in this connexion. In their examination of 20 placentas from tuberculous women, 9 were found to be tuberculous although in only 3 could diagnosis be made with the naked eye. In one of these, a case of miliary tuberculosis, there were scattered miliary tubercles all over the placenta. In the other 6 the diagnosis could only be made microscopically and this entailed in 1 case the examination of nearly 2,000 sections! Lanz (1915) mentions a patient dying of

miliary tuberculosis after 4 months of pregnancy in whom the placenta contained opaque yellow nodules about 1 mm. in size and these were also visible on the membranes. It should also be borne in mind that Whitman and Greene (1922) suggested that the foetus or placenta or both can be infected with tubercle bacilli without any tissue reaction being found. They reviewed 113 authentic cases of congenital tuberculosis which had been published including 24 in which the foetus or placenta contained tubercle bacilli "without any histologic changes."

Faugère and Fréour (1950) describe a case of tuberculous meningitis in which treatment with streptomycin started in the 8th month of pregnancy. The infant, however, delivered at term, died of tuberculous peritonitis 16 days after birth.

On the other hand, in the case of miliary tuberculosis and meningitis described by Rogers, Wilson and Goodier, the infant was apparently quite normal at birth and the Mantoux test was negative. The placenta was macroscopically normal and microscopical examination of sections from 4 blocks failed to reveal tuberculosis. Tubercle bacilli could not be grown from the liquor amnii. Kane (1950) describes 2 cases of tuberculous meningitis treated with streptomycin. In the first the illness began at the 27th week of pregnancy and streptomycin therapy was started in the 29th week. The infant was apparently normal at birth and the Mantoux test was negative. The mother recovered after a further course of intrathecal streptomycin after delivery. In the second case, however, meningitis started as early as the 13th week of pregnancy and treatment with streptomycin was begun in the 15th week. The foetus died at about the 18th week and abortion occurred spontaneously. Extensive calcification of the chorionic villi was found. Swift (1950) records a case of tuberculous meningitis which developed at the 25th week of pregnancy in which treatment was commenced at the 27th. The infection responded well at first but relapsed just before term. The infant appeared quite normal and the Mantoux test was negative. The mother had 2 further relapses but recovered. Silverman and Feinblatt (1948) describe a case of tuberculous meningitis in a woman aged 24, and 20 weeks pregnant. Tubercle bacilli were present in the cerebrospinal fluid. Three grammes of streptomycin were given intramuscularly daily and the total dosage spread over 105 days was 315 g. A total of 15.4 g. of streptomycin was given intrathecally over a period of 72 days, chiefly at the rate of 0.2 g. once daily. A healthy child was delivered at 34 weeks. Both mother and baby were alive and well 8 months after leaving hospital although the mother had impaired hearing and vestibular function. When the patient had been treated for nearly 8 weeks she began to get severe reactions to the intrathecal streptomycin, becoming stuporous and then twitching before developing clonic movements with cyanosis and coma. Unfortunately the report does not give the range of the patient's temperature during the illness nor the result of the examination of the placenta.

Pyrexia of 102–103°F. or over during pregnancy is generally regarded as liable to cause foetal death. The foetus survived in the case of Rogers, Wilson and Goodier, but the patient's temperature did not exceed 102°F. In our patient the fever also usually did not rise above 102°F. but it was higher on 4 occasions, all before the foetus was known to be dead.

The toxic effects of streptomycin must also be considered. The severe reactions following the intrathecal injections are likely to be accompanied by similar effects on the foetus, whether they are due to an irritant action of streptomycin or, as sug-

gested by Smith and Vollum (1950), to the liberation of tuberculin into the cerebrospinal fluid of a sensitized patient. The patient of Silverman and Feinblatt began treatment at about the same week of pregnancy as our patient and the daily dosage of streptomycin was about 50 per cent greater by the intramuscular route, and over double the amount intrathecally. In spite of the larger dosage the foetus survived. Their patient had similar severe reactions of twitching, convulsions and coma but it is noteworthy that they occurred much later in the pregnancy when the foetus would have been 10 weeks more mature than in our case. That rather smaller doses of streptomycin later in pregnancy may not necessarily harm the infant is shown by Watson and Stow (1948). They treated 2 women with 2 g. daily during the 24th to 39th weeks of pregnancy in one case (90 g. total) and 18 to 31 weeks in the second case (95 g. total). One case was of renal tuberculosis and the other of far advanced haematogenous pulmonary tuberculosis. In both, the mother's vestibular function was completely lost but they both had healthy infants not suffering from any toxic effects and without nystagmus or other neurological abnormality. Tuberculin tests were negative at birth and again 6 months later. Kistner (1950) describes 5 cases treated with streptomycin during pregnancy. The dosage and maturity were as follows:

(1) 42 g. from 31 to 37 weeks of pregnancy
(2) 21 g. from 8 to 14 weeks
(3) 42 g. from 14 to 20 weeks
(4) 21 g. from 16 to 22 weeks
(5) 21 g. from 23 to 29 weeks

There was no evidence of toxic effects in the infants, some of which were observed up to 1 year of age. Kistner draws attention to the fact that the streptomycin content in the cord blood and amniotic fluid had been found to be generally lower than in the maternal blood, usually approximately one half, or less. Swift (1950) in 1 case found concentration in cord blood immediately after delivery to be 1 unit per ml., which was the same as that in the maternal blood. There is, therefore, no evidence at present that streptomycin is toxic to the foetus; but none of the cases described by Watson and Stowe (1948), and by Kistner received intrathecal streptomycin which sometimes produces such profound disturbances.

Para-amino-salicylic acid is a much less toxic drug than streptomycin and we have not been able to find any record of it being harmful to the foetus. In adults it can cause gastro-intestinal disturbances chiefly nausea, vomiting and diarrhoea. Some patients become sensitized to P.A.S. and show pyrexia and skin eruptions.

To sum up, we cannot be certain why the foetus died. It would not appear to be due to streptomycin or P.A.S.; but tuberculous infection and toxaemia seem to be likely causes particularly affecting earlier pregnancies, while pyrexia over 102°F. (39°C.) may well be to blame.

Lundström (1947), in the study of 72 cases of miliary tuberculosis and pregnancy, found that in 22 of them the site of dissemination was shown to be genital. In our case the vaginal discharge contained tubercle bacilli but there has not been any other evidence of genital tuberculosis either during the acute illness or during the following year.

The deafness and disordered vestibular function are serious disabilities about which Biagi (1951), and Cathie and Garrow (1951) have written that they consider them more likely to occur if dihydrostreptomycin is used instead of streptomycin. We in fact used only the dihydrostreptomycin because at that time it was thought to be less toxic.

Summary

1. A case of acute miliary tuberculosis and meningitis in pregnancy treated with streptomycin and P.A.S. is described.

2. The foetus died at about the 20th week and no evidence of tuberculosis could be found in the foetus or placenta.

3. The mother was alive and well 12 months after the onset.

4. In only 1 of the 7 cases of miliary or meningitic tuberculosis treated with streptomycin during pregnancy and here discussed was there any evidence of tuberculous infection of the foetus. When the illness occurred before the 16th week of pregnancy a dead foetus resulted in both cases. In the other 5 cases the onset was after the 20th week, the pregnancies continued and living babies were produced, 4 healthy and 1 tuberculous.

It is a pleasure to thank all the staff who have helped to treat this patient, particularly Dr. M. H. Logg, Senior Physician, Dr. E. H. Bailey, Pathologist; and Mr. E. J. White, Technician.

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MITTELWAHN

A Reconsideration of Premenstrual Phenomena

BY

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THE approach of the menstrual period is often heralded by increased nervous irritability and by a certain degree of depression. Some such mental molimina probably occur in the majority of women and may be counted as one of the factors which explain the proverbial capriciousness and unpredictibility of the female temper, but they are rarely of sufficient severity to warrant medical intervention. Sometimes, however, premenstrual depressive states are sufficiently unpleasant to be brought to the notice of the physician and may even constitute a true cyclical psychosis (Hauptmann, 1924; Hanse, 1924) and one of the motive forces of suicide (Heller, 1900; Slavik, 1909). Not infrequently these premenstrual psychological derangements are accompanied by some of the physical molimina such as headaches, mastodynia, swelling of the abdomen and premenstrual dysmenorrhoea, and this ensemble of a varying mixture of physical and mental discomforts has been referred to as the premenstrual tension state (Frank, 1931). Usually these manifestations cease abruptly with the onset of the menstrual flow, although they may be prolonged into the first or second day of menstruation.

The following case is thought worthy of record because the unusual timing within the menstrual cycle of the attacks provides, apart from its intrinsic interest, some valuable clues to the aetiology of this interesting condition.

CASE RECORD

Mrs. A. B., 26 years old, an only child, complains of recurring fits of depression for many years. Her father is described to be of a moody disposition and liable to become very downcast over small things. No periodicity has been noted in his depressions. The father's mother suffered from hay fever and he himself has been subject to food allergy, especially during childhood.

From infancy to the age of about 14 she was subject to recurring attacks of " acidosis " which interfered to some extent with the normal course of her education. Thereafter she continued well with the exception of annual bouts of hay fever.

Menstrual and sex history. Her menarche was at 14 and her periods have always been regular, lasting for 5 to 6 days, and recurring approximately every 28 days. They are usually quite painless, but very occasionally she has a few hours of premenstrual pain. The loss seems to be average. There is no Mittelschmerz. Occasionally she has one day's constipation at the end of her period. No other physical molimina. She was married a year ago, has no children, and does not suffer from dyspareunia. Her sex life is satisfactory.

Complaint. At the age of approximately 14 she began to develop fits of depression in which she thought her parents were going to abandon her, together with a sense of unworthiness, i.e., with the conviction that her parents would be justified in doing so. These attacks recurred quite often though with doubtful regularity and she has never been free from them for any length of time. Only since her marriage has it occurred to the combined observation of husband and patient that there is a considerable periodicity in these fits, with an alternation of small depressions of 1 to 2 days' duration with bigger attacks of 3 to 4 days' dura-

tion. The two types of attack are separated by an interval of approximately a fortnight. Her husband can foretell the coming of an attack by subtle changes in her behaviour and during the height of the attack there is a pronounced change in her appearance. She " looks much older ", " saggy ", and " her looks go all to pot ". There is no loss or increase of appetite, no swelling of the abdomen or other parts, no ulcerations of mouth or vulva, no nymphomania, but occasionally a slight degree of mastodynia. The depression rarely rises to suicidal pitch, but there is always an intense feeling of inadequacy and a conviction that those around her are aware of this inadequacy and react correspondingly. These fits of depression, which are punctuated by crying spells, are worst at night and fluctuate in intensity during the day. They are accompanied by a sense of unreality and are followed by 1 or 2 days of elation.

The patient is very worried about these attacks, which are intensely unpleasant and threaten to ruin her married life. She is also afraid that these attacks may be the forerunner of madness. Direct questioning elicits the information that every alternate attack seems to come just before a period and stops with the start of menstruation.

Examination. Complete physical examination revealed an attractive young woman of normal feminine proportions, well covered, and without any physical abnormality with the exception of a small and reducible prolapse of the rectum. Hair distribution and pigmentation are normal. Inspection of the vulva, bi-manual vaginal examination and a complete examination of the central nervous system were all equally negative.

Management of the case and further history. To afford symptomatic relief during the period of investigation Dexedrine tablets (d-desoxy-ephedrine) were prescribed. The patient was instructed to keep a daily record of the oral waking temperature and a record of the dates of her fits of depression and of the onset of the menstrual period. A graphic representation of these records is given in Figure 1. The Dexedrine therapy afforded amelio-

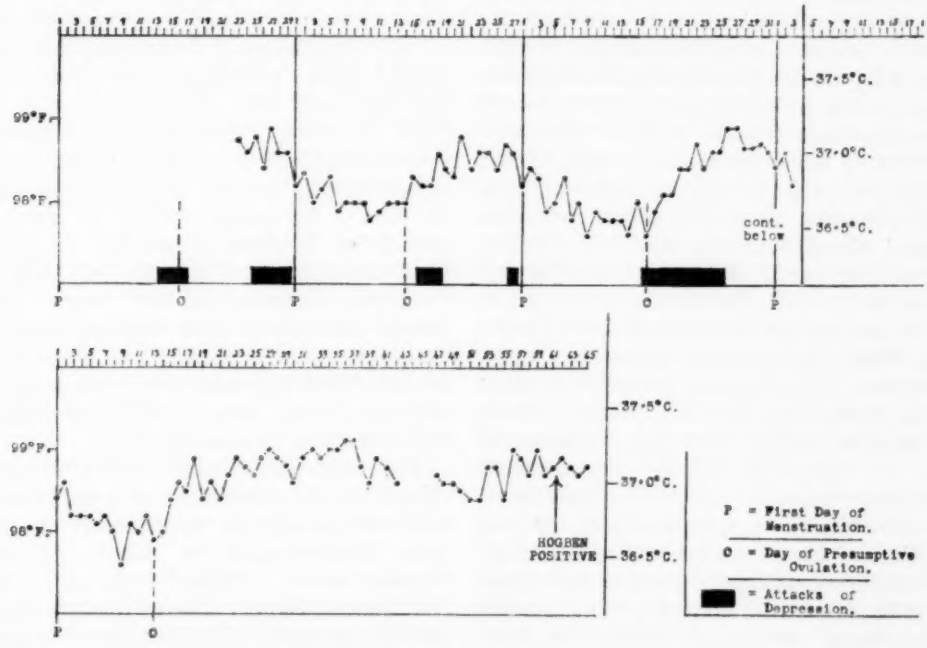

FIG. 1

Basal oral temperatures of patient A.B.

ration of her symptoms, but was not capable of suppressing entirely her fits of melancholia. After 3 months observation, Phenergan 25 mg. was substituted for Dexedrine. This treatment seemed to work—to use the patient's own words—" like a charm ", and she continued for some weeks without any sign of depression. Therapeutic pride, however, was nipped in the bud when the next menstrual period failed to materialize and when the continued high temperature revealed that pregnancy had occurred. The patient had been warned at the beginning of treatment to avoid a pregnancy as it was feared that she might be particularly prone to develop a puerperal psychosis. This fear proved groundless in the event and, having passed through a normal pregnancy untroubled by any fits of depression, she was safely delivered at term of a healthy boy.

Discussion

The clinical picture in this case was very reminiscent of the original description by Frank (1931). It had been clear from the history of this case and was proved beyond doubt by the temperature records that one was dealing in this instance with a case of premenstrual tension which, however, tended to have additional attacks of the same type about the time of ovulation. The first recorded ovulatory attack occurred round about ovulation and lasted for 3 days. The second attack started on the day after which ovulation can be presumed to have taken place and also lasted for 3 days. The third attack started on the day of presumptive ovulation and lasted for 11 days with fluctuating severity. These attacks were quite distinct from the premenstrual fits of depression which also occurred during the period of observation (see chart).

The mental accompaniments of the ovulative phase have been investigated by a number of workers. Harvey and Crockett (1932), at the end of a paper on the temperature differences during the menstrual cycle, expressed the suspicion that there was a brief period of emotional depression shortly after the beginning of the rise in temperature. A case of ovulation psychosis has been described (Hutter, 1933) where schizophrenic attacks in an institutionalized patient tended to occur about midcycle and to remit spontaneously 4 to 5 days before the onset of menstruation. A further relevant case was reported by Hamburger and Courtin (1939) in which a psychosis, consequent upon oestrogen therapy and finally relieved by corpus luteum administration, showed regular periods of aggravation about 14 days after the first day of menstruation. A psychoanalytic study of 4 patients was carried out by Benedek and Rubenstein (1939) and led to the conclusion that the time of ovulation is marked by a change from a heterosexual tendency to a passive receptive and narcissistic attitude. Whether this conclusion can be generalized is open to doubt. Holt recognizes an ovulation syndrome which, on the psychological side, comprises increased libido, irritability, mental depression, insomnia and dreams, especially of erotic character (Holt, 1937). Altmann and his associates in an investigation on 10 college women came to the conclusion that the time of ovulation tends to be characterized by heightened activity, freedom from nervous tension and by elation (Altmann, Knowles and Bull, 1941). The present case differs from those reported in various respects, especially in the fact that the attacks of depression which occurred at ovulation were, after a short remission, repeated in the premenstruum.

The term Mittelwahn, which I have coined for the association of a depressive state with ovulation, is modelled on the term Mittelschmerz by substituting the German word "Wahn" (delusion) for "Schmerz" (pain). One might with equal justification speak of an ovulatory tension state. This interesting condition may be added to a number of others, all of which

suggest that the physiological disturbances of ovulation are in many respects similar to those of menstruation; thus dysmenorrhoea is paralleled by Mittelschmerz, and the menstrual flow is sometimes imitated by uterine bleeding at the time of ovulation. We know, moreover, that endocrine activity around ovulation has features which are similar to those at menstruation, e.g., it is generally admitted that a slight drop in oestrogen level occurs at ovulation. Brewer (1938) who described a marked premenstrual drop of capillary resistance, found the same change occurring at ovulation in some cases. Heerhaber (1948) who demonstrated an increased sensitivity of the respiratory centre before menstruation, observed the same phenomenon in some cases at ovulation. Morton (1950) described recurrent puffiness of the face at mid-cycle, and I have records of cases who show an evanescent ovulatory increase in weight, thus confirming Thorn's observations on this point (Thorn, Nelson and Thorn, 1938). Indeed the famous dictum of Baudelocque, "La menstruation c'est un petit avortement", might be paraphrased with justice into "L'ovulation c'est une petite menstruation."

Whilst authors on the subject of premenstrual tension have laid special emphasis on the possible endocrine causes for this condition (Frank, 1931; Israel, 1938; Greenblatt, 1940; Greenhill and Freed, 1941; Morton, 1950) the suggestion that it may be largely or entirely a psychogenic disturbance has received support from the fact that subjects of this complaint not infrequently are psychologically unstable and come from psychologically unstable families. When we are dealing with an event like menstruation, the advent of which is expected by the patient, such an explanation is difficult to disprove. In the present case, however, dealing with a young woman who was ignorant even of the existence of such a thing as ovulation, the coincidence of fits of depression with the occurrence of ovulation may be taken as a strong argument discounting the possibility of a psychogenic origin of ovulatory tension and therefore by implication of premenstrual tension (to which this patient incidentally was also subject). This does not alter the fact that mental instability is one of the important predisposing causes of this condition. In other words, the present case strongly supports the suggestion that premenstrual tension is caused by an endocrine disturbance acting upon a susceptible central nervous system.

The case seems, moreover, to throw some light also on the nature of the endocrine disturbance in question. It has been suggested that premenstrual tension is the expression of deficient formation of corpus luteum (Morton, 1950; Israel, 1938). The onset of symptoms just before or immediately after ovulation, i.e., at a time when corpus luteum growth has normally hardly started, makes it extremely unlikely that this explanation could hold good for the present case, and to that extent throws doubt on the whole concept, especially as there was such a clearcut interval between the ovulatory and the premenstrual attacks. Moreover, it is difficult to see why a complaint which is due to defective luteinization should be promptly and dramatically cured at the onset of menstruation, i.e., at the very moment when progesterone activity falls to its lowest level. It would seem more likely that the defective luteinization, which is undoubtedly a feature of many cases of premenstrual tension, is an associated symptom rather than a causative factor, especially as the evidence from endometrial biopsies on this point is by no means unanimous (Morton, 1950; Greenblatt, 1940). This criterion, viz., the occurrence of "premenstrual" and "menstrual"

phenomena at ovulation, could be usefully applied more widely to differentiate true progesterone effects from apparent ones. For example, the above-mentioned premenstrual increase in the sensitivity of the respiratory centre was explained by the author as a progesterone effect. She adduces some pharmacological evidence for this view. However, in two cases, an identical change occurred also around ovulation which throws doubt on this explanation. Pharmacological evidence is almost valueless in this particular problem, for reasons which will be stated below.

The alternative theory that we are dealing in this condition with an effect of excessive oestrogen secretion, either absolute or relative (Frank, 1931), receives neither support nor contradiction from the present case, except that the prompt cessation of symptoms with the occurrence of pregnancy is not in keeping with the idea that raised oestrogen levels in themselves are responsible for premenstrual tension. Furthermore, although water and salt retention can be induced experimentally by oestrogen administration (Thorn, Nelson and Thorn, 1938), it has been overlooked by authors on this subject that the maximum swelling and increase in weight in both normal women and in subjects of premenstrual tension occurs in the last few days before the onset of menstruation, i.e., at a time when oestrogen levels have been steadily falling for about a week.

Morton (1950) proposes the interesting hypothesis that the premenstrual tension state is caused by a relative excess of oestrogen over progesterone. To point out only one inconsistency of this hypothesis we may note that over half of the patients in Morton's series showed premenstrual oedema, or swelling or gain of weight in one form or another. This symptom he and others attribute to the action of oestrogens. However, the same water and salt retaining property is shared very markedly by progesterone (Harrop, 1937). Yet Morton's hypothesis relies on increasing progesterone secretion for the cure of premenstrual oedema. Another weakness of his concept lies in the fact that according to it the premenstrual tension state should be very common and severe in anovular cycles and in cases of metropathia haemorrhagica. This is not the case.

In the past the endocrine explanations advanced for disorders of the menstrual cycle have almost entirely been confined to considerations of disturbed progesterone or oestrogen metabolism. It is becoming increasingly clear, however, that the adrenal cortex plays an essential and constant part in the maintenance of normal menstrual function. A cyclic activity of the adrenal cortex has been demonstrated in both women and animals (Andersen and Kennedy, 1932; Bourne and Zuckermann, 1940; Bourne and Zuckermann, 1940–41; Hunt, 1940–41; Broster, 1946) and amenorrhoea is a constant symptom of certain adrenal diseases. The time has probably come to consider how far dysfunction of the adrenal cortex may be implicated in the causation of various menstrual disorders. For example, the old observations that amenorrhoea is often accompanied by eosinopenia whilst eosinophilia is found in cases of menorrhagia and to a lesser extent during normal menstruation (Adler, 1912; Dirks, 1912) gains a new significance in the light of recent knowledge about the inter-relation between the number of circulating eosinophils and adrenal activity (Forsham, Thorn, Prunty and Hill, 1948.) Many other features of normal and abnormal menstrual cycles point in the same direction. The increase in capillary permeability which occurs in the premenstrual phase of both normal and abnormal cycles (Brewer, 1938; Heilig

and Hoff, 1924; Benda, 1925; Petersen and Milles, 1926) might be caused by a premenstrual depression of adrenal activity, as cortical hormones have been shown to reduce capillary permeability (Menkin, 1942; Freed and Lindner, 1941; Shleser and Freed, 1942). Premenstrual hyperuricacidaemia with a sharp drop during menstruation and a secondary rise immediately after the period (Okey and Erikson, 1926) is also best explained by adrenocortical influence (Sprague *et al.*, 1950) especially as the pre- and post-menstrual levels of ovarian hormones are so different from one another as to make an ovarian explanation unlikely. Premenstrual fever has been reported on various occasions (Grenville-Mathers, 1946; Reimann, 1946) and this, too, is susceptible of an adrenal explanation as corticoids suppress fever and can keep it latent (Selye, 1950a). The marked water and salt retention, which is a common feature of the premenstrual tension state and which may indeed be the dominant symptom, could easily be explained by excessive mineralo-corticoid activity. The hypoglycaemia, which Morton (1950) believes to have demonstrated in these patients, could be the expression of deficient glucocorticoid secretion.

The mental symptoms can, in the light of recent experiences with A.C.T.H. and cortisone (Sprague *et al.*, 1950; Hench, 1950), also be explained by a disorder of cortical secretion. Attempts to explain them on the basis of a progesterone-oestrogen imbalance alone have never been very convincing as they run counter to the pharmacology of these substances. The body of knowledge on the inter-relation of A.C.T.H. and cortical hormone to neuropsychiatric disease is rapidly growing and has already produced interesting results in the treatment of mental disease. The whole subject, which sheds new light on the well-known frequency of amenorrhoea in psychotic patients (Hanse, 1923), has been reviewed briefly by Selye (1950b).

Another interesting feature of cyclical disturbances in women is that they often either assume the form of allergic attacks or occur in individuals suffering from allergy. Thus we have records of menstrual urticaria, asthma, migraine, mucous colitis, angioneurotic oedema, etc. (Claude and Vall, 1938; Peters, 1934; Rowe, 1932), or, as in the present case, we find that an allergic disorder of childhood passes at menarche into a menstrual complaint. Recent advances in this field have shown that the allergic constitution is not alone to be sought in a peripheral inadequacy of the antigen-antibody mechanisms, but also in a relative weakness of adrenal cortical action, adrenal hormones being of great efficacy in suppressing allergic phenomena (Ludy and Appleton, 1939; Rose, 1950; Randolph and Rollins, 1950) and more especially in reducing the sensitivity of the tissues to histamine (Gottesman and Perla, 1931; Dragstedt, Mills and Mead, 1937; Wolfram and Zwemer, 1935). Moreover the release of antibodies seems to be under adrenal control (Feinstein, 1947; Billingham, Krohn and Medawar, 1951) and there is evidence from numerous sources that antibody titres show a characteristic variation during the menstrual cycle (Jungeblut and Bailly, 1938; Ross and Peizer, 1936; Hansen-Pruss and Raymond, 1943).

Here again the assumption that a periodic dysfunction or hypofunction of the adrenal cortex may play a part in the causation of the premenstrual tension state would serve to clarify the position by bringing diverse symptoms under one aetiological roof. In the present state of knowledge we cannot, however, exclude the possibility that the normal cyclical fluctuations of adrenal activity may provoke symptoms in women who

have a latent weakness of one or other "shock organ", in this particular case, the cerebral cortex. Thus, present day advances in our understanding of adrenal function enable us to conceive the whole extragenital symptom complex of normal and disturbed menstrual function (of which the premenstrual tension state is only one small aspect) on an adrenocortical basis.

Whilst all this evidence makes it perfectly clear that the classical ovarian-pituitary dualism is not a sufficient basis for the understanding of menstrual disorders, it would be foolish to try and replace this by an adrenocortical totalitarianism. Endocrine research has brought to light such an inextricable network of interaction and interdependence of the various glands that it may be taken as axiomatic that any endocrine upset will almost from the very outset be a pluriglandular one. Activity of the adrenal gland may be necessary to proper luteinization (Chamorro, 1946). This might be used as an argument for the causal role of the adrenal cortex in the defective luteinization of the premenstrual state. On the other hand, progesterone may act as a stimulus to adrenal cortical secretion (Kimeldorf and Soderwall, 1947), and this might indicate that any defective action of the adrenal gland during menstrual disorders could be blamed on defective luteinization. Furthermore, we know that progesterone has a structure and pharmacological action not unlike some of the adrenal cortical hormones (Miescher, Fischer and Tschopp, 1938) whilst DOCA shows considerable progestational activity (Robson, 1939). These facts serve further to confuse the aetiological and therapeutic issues and make any conclusions drawn from therapeutic response to these substances largely valueless. Oestrogen also may stimulate adrenal cortical secretion (Kimeldorf and Soderwall, 1947) or, on the other hand, depress it by its inhibitory action on the hypophysis. The ovary can, to some extent, substitute the functions of the adrenal gland (Hill, 1948) and the adrenal gland produces both oestrogens and progesterone (Butler and Marrian, 1937; Beall and Reichstein, 1938; Beall, 1939) so that at any given moment the question, which of the two glands is responsible for the altered functional state of the other, may be quite insoluble.

This small selection of facts, which could have been many times multiplied, proves that, whilst it is practically impossible to disentangle the functional precedence within the intact organism of endocrine glands, such an attempt becomes nothing short of absurd when it is applied to a cyclical functional disorder. It would therefore be wrong to conclude that adrenal dysfunction is the "cause" of premenstrual tension. On the other hand, the time has come to recognize that adrenal activity certainly enters into these conditions and recognition of this fact might lead to important advances in the management of these cases.

From the foregoing it will become clear that the therapeutic successes which have been achieved in these conditions, however gratifying they may have been to the patients and doctors, can add little to our understanding of the essential nature of premenstrual disturbances unless, indeed, one takes the view that the very multiplicity of remedies provides a clue. In the past such multiplicity would have been regarded as presumptive evidence of the psychogenic nature of the disease concerned but the important researches of Selye have demonstrated that, in the endocrine field, such a uniform response to different stimuli can be expected from the adrenal cortex.

The management of the case reported

here was simple. Dexedrine, which was used initially, has the advantage of giving sufficient relief to reassure the patient without at the same time masking the attacks. It thus allows the investigation to be completed. Phenergen was then tried because the allergic antecedents of the patient gave rise to the suspicion that the depressive fits might also have an allergic or a histamine basis. Whether it helped cannot be said but at least it did no harm. The condition was cured by the occurrence of pregnancy (as is the rule in these cyclical premenstrual disturbances). Some would no doubt conclude that the corpus luteum of pregnancy had effected this cure whilst I tend to think in terms of enhanced adrenal activity (Hartman and Brownell, 1949) and am reminded of remissions in the course of rheumatoid arthritis which often occur during pregnancy.

Summary

A case of premenstrual tension is described in which attacks also occurred in relation to ovulation. The frequently noted occurrence of "premenstrual" phenomena at mid-cycle tends to throw doubt on current theories about the causation of these phenomena. The question of normal and pathological cyclical changes is discussed and special attention drawn to the part which the adrenal cortex may play in them.

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MATERNAL OBSTETRICAL PARALYSIS

With a Report of Two Cases

BY

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INJURY to the peripheral nerves of the lower extremities is an interesting but rare complication of pregnancy and labour. Most authorities are in agreement as to the rarity of the condition. Thus, Chalmers (1949), in a recent survey of this subject, has collected 146 cases from the literature, the first being described by von Basedow in 1838. Beattie (1933) found an incidence of 3 cases in 8,000 deliveries and Tillman (1935) one of 9 cases in 18,800, both over a period of 10 years. However, O'Connell (1944) suggests that the condition is more frequent than is realized and that careful neurological examination after labour, particularly difficult or instrumental labour, would reveal many cases showing minimal and transitory signs of nerve affection.

This form of nerve affection has been called traumatic neuritis of the puerperium. Certainly this title serves to emphasize its traumatic or mechanical aetiology and to place in a different category those cases of peripheral neuritis in pregnant and puerperal women due to toxaemic causes, hypovitaminosis, and puerperal infection. Infection was at one time, in varying degree, a common cause of peripheral paralysis. Matthews Duncan (1886), for example, described with lucid clarity the autopsy findings in a severe case of pelvic cellulitis. The whole region of the psoas major muscle was converted into a huge abscess cavity, and, "through it, stretched like fiddle strings, passed the bare nerves."

Modern textbooks of obstetrics pay scant, if any, attention to this condition and thus the case histories and discussion that follow may be of some interest.

CASE 1. Mrs. B. P., aged 21 years, primigravid, commenced labour on 8th June, 1950, 2 days after her expected date of delivery. Her pregnancy had been uneventful. At term the foetus appeared large and the head had not engaged; there was, however, no evidence of disproportion. The first stage lasted 30 hours, during which time the head engaged and the patient complained of occasional attacks of cramp-like pain in the left buttock, thigh, and calf. After 3 hours in the second stage the vertex had reached low mid cavity in the left occipito anterior position but progress had ceased. Under gas, oxygen and ether anaesthesia, low forceps were applied and a male infant delivered without difficulty. The baby, weighing 11 pounds 2 ounces, breathed spontaneously, later cried lustily and gave rise to no further anxiety. The day after delivery, the patient complained of pain in the left calf muscles and was unable to dorsiflex or evert the foot. A back splint was applied. Three days later all pain had gone but a definite palsy related to the anterior tibial and peroneal branches of the external popliteal nerve was present. At no time had there been any objective loss of sensation in the affected limb.

The puerperium otherwise was uncomplicated, and mother and infant were discharged on the 14th postpartum day. The patient was instructed to continue the use of a back splint, except for short periods during the day. An intensive course of physiotherapy was instituted and consisted of massage, exercises and electrical stimulation to the affected muscle groups. Under this regime, recovery was remarkably quick. Eight weeks

postpartum the patient had regained sufficient power of dorsiflexion of her foot to walk without untoward disability. Thigh and calf measurements showed only moderate wasting. When seen recently, 8 months after the initial paralysis, the patient looked very well and stated that she could walk normally. However, on examination, slight residual wasting could still be elicited and full power had not returned to the movement of dorsiflexion. The power of eversion was normal. X-ray pelvimetry was performed. The inlet view (Fig. 1) showed asymmetry with absence of any marked sacral promontory and therefore shallow sacro-iliac fossae; this shallowness is particularly marked on the left side where the joint region actually appears to protrude into the cavity. The lateral view showed a normal sacral curve with adequate pelvic measurements. The internal conjugate measured 4½ inches. Views taken of the spine showed that there was a lateral tilt of L4 on L5 and compensatory lumbo-dorsal scoliosis. The latter finding is of interest in relation to the disc protrusion theory of O'Connell (1944) and is later discussed in this paper.

Case 2. Mrs. B. M. C., aged 38 years, gravida 3, para 1, commenced labour on 3rd February, 1951, 2 days beyond the calculated date. Her first pregnancy in 1942 had terminated in the normal delivery of a live male infant, weighing 5 pounds 10 ounces. Following this, in 1949, there had been a miscarriage at 16 weeks. Antenatal examination in the present pregnancy showed the patient to be of moderate build (weight 7½ stones, height 5 feet) and to possess generous external pelvic measurements. The pregnancy had proceeded uneventfully. At the commencement of labour the foetus presented by the vertex in the left occipito anterior position with the head high and mobile. The first stage, characterized by uterine contractions of good quality throughout, lasted 12 hours. At the end of this period the foetal head was noted to be just engaged. There was marked foetal distress and it was decided to deliver by forceps. Under spinal anaesthesia (1 ml. heavy nupercaine), vaginal examination revealed the head to be just engaged in the left occipito transverse position with evident asynclitism. The antero-posterior diameter of the mid-pelvis appeared to be contracted. Kielland's forceps were applied and, with considerable traction, a stillborn male infant, weighing 7¼ pounds, was delivered. Autopsy revealed the cause of death to be tentorial tears with haemorrhage.

Two days after delivery, the patient complained of residual numbness in the right leg and it was noted that there was a well-marked paralysis of the anterior tibial nerve, resulting in foot drop. The peronei appear to have escaped damage. The same treatment as detailed in Case 1 was instituted and the patient was discharged, after an otherwise normal puerperium, on the 14th postpartum day. At the time of writing progress towards recovery, initially slow, is proceeding satisfactorily.

X-ray pelvimetry was performed before discharge. The inlet view (Fig. 2) showed considerable flattening and again, as in the first case, the sacro-iliac joint regions were seen to be relatively exposed by the absence of marked sacral prominence. The lateral view (Fig. 3) showed well-marked sacral flattening and a small internal conjugate of 3¾ inches. The outlet was android in shape.

Discussion

The majority of cases of lower limb paralysis following childbirth occur after difficult deliveries—instrumental deliveries of cases demonstrating some degree of cephalo-pelvic disproportion—and the subsequent nerve affection is often of the external popliteal division of the sciatic nerve on one or other side. However, there is reported in the literature a number of cases in which the paralysis was antepartum, followed normal labour or breech presentation, or was bilateral in distribution. Some cases demonstrated involvement of the femoral nerve or the whole sciatic nerve.

Thus any theories put forward to explain the occurrence must explain this diversity of syndrome type. The theories which have been advanced, and which are detailed below, explain fairly adequately the mechanisms at work in producing the

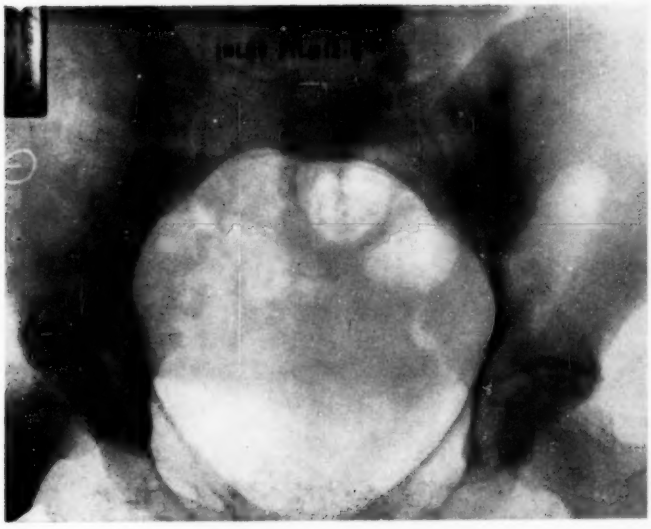

FIG. 1
Showing asymmetry of the inlet and shallow sacro-iliac fossae.

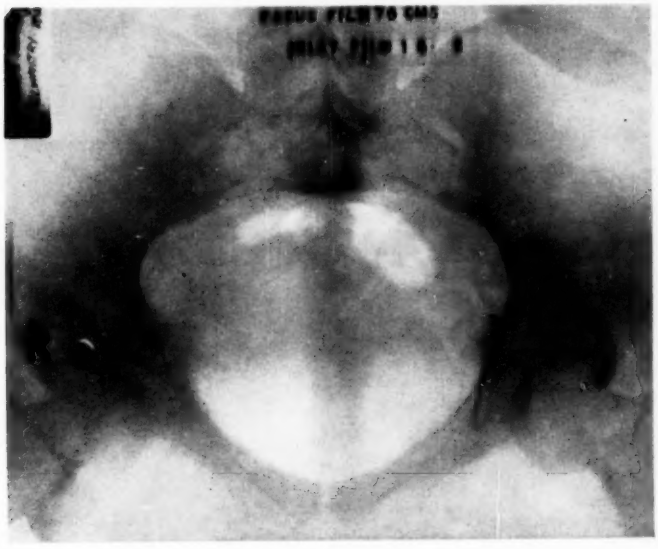

FIG. 2
Showing flattening of the inlet and shallow sacro-iliac fossae.

FIG. 3

Lateral view showing well-marked flattening of the sacrum and reduced internal conjugate measurement (retouched).

various syndromes. However, considering the relative frequency in which these mechanisms must operate in obstetrics, it is very surprising that the condition of maternal obstetrical paralysis is not far more common. This apparent paradox receives little discussion in any of the published literature.

Theories of Aetiology

(1) *Lumbo-sacral Cord Compression*

It was Bianchi, in 1867, who first advanced the theory that the foetal head could compress the lumbo-sacral cord at the pelvic brim and thus cause paralysis of the external popliteal nerve. Hünermann wrote further on the subject in 1892 and, following him, many writers have discussed the mechanism involved. All these authorities agree as to the known anatomical and neurological facts. The lumbo-sacral cord, derived from L4 and L5, sweeps across the region of the sacro-iliac joint to enter the true pelvis and join with the sacral roots to form, in part, the sciatic nerve. This cord carries the fibres destined for the external popliteal and tibial nerves, the former being in the dorsal position and adjacent to the bony brim of the pelvis; for in this position the lumbo-sacral cord, although behind the iliac vessels, lies neither on the pyriformis nor is it protected by the psoas muscle. Thus the external popliteal fibres are those that may suffer if the widest diameter of the head compresses the cord against the bone as the head sinks into the pelvis. However, many cases of paralysis are found to have the affection on the leg opposite to that side of the pelvis which accommodated the widest diameter. Beattie (1933) explained these by demonstrating, on a dissected pelvis, how easily the forceps blade may injure the cord, particularly in high or mid-cavity instrumental deliveries. Tillman (1935) appears to have been the first to study the pelvis radiologically in his cases. Both he, and subsequently Cole (1946), showed that the pelvis usually exhibited a flattened sacral promontory and thus shallow sacro-iliac fossae exposing the cord more than usual to pressure. Thus the rare platypelloid pelvis, and to some the generally contracted pelvis, may be expected to give rise to the syndrome; but the common flat pelvis, with its deep fossae on either side of the prominent promontory, is unlikely to do so.

(2) *Rotation of the Sacrum*

Writing in 1925, Lambrinudi brought forward the theory of backward rotation of the sacrum as a cause of maternal obstetrical paralysis.

He stated that the lumbo-sacral cord was one of the tautest nerves in the body and could be stretched still further by rotation of the sacrum. That this rotation occurs is undisputed; with the increasing lumbar lordosis of late pregnancy and under the influence of "relaxin" it is conceivable that sufficient stretching of the nerve may occur to produce antepartum paralysis, as described by Patel (1905), or at least symptoms of sciatic pain. With increasing rotation during labour, the condition may become finally established.

Matthews Duncan (1868) in his *Researches in Obstetrics* went into this matter in detail apropos the pelvis of the cow. Here the symphysis is solidly united by bone and all the pelvic "give" is produced by sacro-iliac rotation. This, apart from causing antepartum hind leg paresis in the animal, appears to cause traction on the roots of the lumbo-sacral cord as is shown by the finding of blood in the cerebro-spinal fluid.

Lambrinudi's (1925) theory explains the occurrence of external popliteal palsy in normal and uncomplicated labour, particularly where the occiput occupies the

pelvis opposite to the affected cord and it explains the occasional bilateral case. However, if this hypothesis is correct, one would expect every case to be bilateral, unless, it is argued, and this is undoubtedly true, that the anatomy of the lumbo-sacral cord varies from one side of the pelvis to the other. In the human subject some light might be shed on this theory if a lumbar puncture could be performed in every case soon after the onset of the paralysis and blood found in the fluid. One of the cases described recently by Chalmers (1949) was of this type. The pelvic brim was of normal gynaecoid shape but some 15 months after the relevant delivery, one of the sacro-iliac joints was completely obliterated and this the author attributed to the severe rotational strain which the joint had undergone.

(3) *Intervertebral Disc Protrusion*

O'Connell (1944) has suggested that protrusion of an intervertebral disc before or during labour is the cause of maternal paralysis "in a proportion, perhaps a large proportion, of cases." This mechanism cannot be termed a theory, since in his 4 published cases, disc protrusion was proved at operation and removal produced cure of the symptoms. It explains at once those cases which exhibit antepartum sciatica, even paralysis, followed by definite postpartum lower limb nerve affection. It also explains cases following breech delivery, bilateral nerve lesions, lesions of the femoral nerve —which could be produced by no other mechanical factor—and finally, a disc protrusion would explain those cases following perfectly normal labour. The writer suggests that the operation of the hormone "relaxin", the lumbar lordosis of late pregnancy, and the stresses of labour are all easily understood factors in the production of disc protrusion. This protrusion was found to occur between L5 and S1 in 3 of his cases and between L4 and L5 in the 4th case. Femoral nerve involvement could be explained by a disc protrusion between L2 and 3 or L3 and 4.

In the type of case in which the external popliteal nerve is picked out, pain is usually felt in the calf and is transitory. In O'Connell's (1944) cases sciatic pain is a predominant, in fact the major, symptom, and is lasting. Moreover, the sciatica is typical in that it is accompanied by lumbar scoliosis, limitation of movement and of straight leg raising, a generally flexed attitude, pain made worse by coughing and a much wider involvement of peripheral nerves. For example, only the muscles supplied by the femoral nerve may escape and the signs may range from gluteal wasting to weakness of plantar flexion and inversion of the foot.

It would seem, therefore, that compared with the restricted lumbo-sacral lesion described, the symptom-sign complex of disc protrusion is a much wider one and allows of these cases to be easily differentiated. Undoubtedly this mechanism is at work in some cases of maternal obstetrical paralysis but it would appear doubtful to be the factor alone responsible in a large proportion.

(4) *Other Mechanisms*

It should not be forgotten that a badly adjusted leg stirrup in a lithotomy position may produce external popliteal paralysis by pressure on that nerve as it winds around the neck of the fibula.

Spinal anaesthesia is occasionally followed by residual lower limb paralysis. This cauda equina lesion is variable in its extent and the one aetiological factor of importance appears to be a high concentration of the injected anaesthetic agent affecting one particular portion of the cauda equina. The emphasis is upon loss

of bladder and sphincter control and the non-traumatic aetiology is reflected in the occasional occurrence of a cranial nerve palsy, particularly the 6th nerve (Bryce-Smith and Macintosh, 1951).

Comment

In the first case described in this paper the paralysis was probably caused by lumbo-sacral cord compression. The X-ray view of the inlet reveals a typical exposure of the nerve to pressure by the head and, with a huge infant of head circumference 15½ inches, it can be understood how the leg paralysis was caused and was on the same side as the occiput lay in the pelvis (Fig. 1). It would, however, be possible to make out a case of intervertebral disc protrusion since pain, wasting and scoliosis were all present. The fact that no lumbar disc lesion was visible on plain X-ray does not negative the possibility.

The second case demonstrated the lesion in the leg opposite the side of the pelvis occupied by the occiput. Here one of three factors may have caused the syndrome. It is not impossible that, with a contracted inlet, the sincipital portion of the foetal skull may have pressed upon the lumbo-sacral cord. Secondly, the tip of the posterior blade of the Kielland forceps might have traumatized the right cord in the process of rotation of the head from the left occipito transverse to the occipito-anterior position. Beattie (1933) emphasized this mechanism in explanation of contralateral paralysis and, as already described, it can be demonstrated with a mannikin, a pelvis and a pair of Kielland forceps. Finally the condition might have been brought about by the mechanism of backward rotation of the sacrum, this rotation being accentuated by the forces incidental to a difficult forceps extraction through a contracted mid-pelvic strait.

In passing it must be admitted that the antenatal supervision of this case is worthy of adverse criticism. Clinical estimation of the pelvis at the 36th week failed to show the reduced internal conjugate and the flattened sacrum. It demonstrated, once again, how easily a false sense of security may be engendered if insufficient attention is paid to the birth weight of a previous, apparently normal, delivery.

Summary

It is probably true to state that the theory first enlarged upon by Hünermann (1892) fell into disrepute, for the reasons given, until radiological examination of brim shape became more frequent. Since then, with the realization that the lumbo-sacral cord is well exposed to pressure in certain pelves, the theory has regained acceptance and it undoubtedly accounts for many of the reported cases and the first case described in this paper.

Lambrinudi's (1925) theory awaits definite proof. It would seem to be the only explanation at present available for external popliteal palsy *per se* following normal delivery of a normal-sized infant from a normal pelvis.

Intervertebral disc protrusion undoubtedly causes maternal obstetrical paralysis of a well defined type in some cases.

About 100 years ago Churchill (1854) wrote on the subject of maternal paralysis following the supposed pressure by the foetus or forceps on pelvic nerves. He stated, "if we recollect the number of severe and prolonged instrumental deliveries which take place without any such result, I think we must reject this peculiarity of labour as a necessary or frequent cause." Whereas, at the present day, this view can no longer escape challenge, it does serve to emphasize the surprising rarity of maternal paralysis in relation to the com-

parative frequency in which the theories of mechanism detailed above might be expected to operate.

I am indebted to Professor G. G. Lennon and to Dr. P. Phillips for their criticism of this paper and for their permission to publish details of cases. I am grateful to Mr. J. E. A. O'Connell for advising me on several points. My thanks are also due to Mr. Godman of the department of Photography of Bristol University.

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OVARIAN ABSCESS DURING PREGNANCY

BY

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OVARIAN abscess during pregnancy is a rare complication and the following case was considered sufficiently interesting to report:

CASE HISTORY

A married woman, aged 27 years, 2-para, was admitted to Southmead Hospital on 25th April, 1950, complaining of abdominal pain of 3 days' duration. She had always enjoyed good health and gave no history of any serious illness. Her previous confinements had both been normal. There was no history of any abortion.

The last menstrual period commenced on 20th December, 1949. She had been quite well during the pregnancy until 22nd April, 1950, i.e., 3 days before admission, when she complained of backache and stated that her abdomen was "sore." The following evening the pain became more severe and generalized and she consulted her doctor. During that night she developed some diarrhoea which persisted until the morning of 24th April, since when the bowels had not been opened. She had had no nausea or vomiting, and there were no urinary symptoms.

On admission the patient's general condition was good, but she was distressed and in much pain. Temperature was 98°F., pulse rate 98 and blood-pressure 120/70. The uterus was enlarged to the size of a 20-weeks pregnancy, which was larger than the period of amenorrhoea would suggest. Foetal parts could not be palpated and there was no foetal heart or souffle. There was marked tenderness all over the abdomen and considerable rigidity in the right iliac fossa.

Vaginal examination revealed a closed multiparous cervix with no discharge or bleeding. There was an indefinite tender swelling in the right fornix, and these findings were confirmed on rectal examination. The urine was normal microscopically. The haemoglobin was 90 per cent and the white cell count 14,400 per c.mm.

The diagnosis presented some difficulty, but appeared to lie between ovarian cyst with torsion and appendicular abscess complicating pregnancy. In view of the uncertainty of the diagnosis, laparotomy was considered necessary.

The abdomen was opened through a right paramedian incision and, on incising the peritoneum, free pus was found in the peritoneal cavity. The uterus appeared normal for a 20-weeks gestation. There were several recent adhesions between the appendix and right appendages, but these were separated without difficulty, and when the appendix was examined it appeared perfectly normal to the naked eye. The right ovary was enlarged to the size of a tangerine and contained an ovoid mass the size of a hen's egg, which discharged pus. The right Fallopian tube was very oedematous and thought to be diseased. The left tube and ovary were normal and conserved. No pus could be seen discharging from its fimbrial end. A swab was taken from the peritoneal cavity and the ovarian abscess. These later revealed numerous Gram-positive cocci, which on culture produced a pure heavy growth of slightly haemolytic anaerobic streptococci. The aerobic cultures were sterile and T.B. culture proved negative.

It seemed unwise and pointless to conserve the right ovary, and so a right salpingo-oöphorectomy and appendicectomy were performed, and the abdomen closed in layers without drainage. Penicillin and chemotherapy were commenced immediately. Twelve hours later the patient aborted an anencephalic monster, in spite of the administration of morphine and progesterone.

The wound broke down on the 8th day, pus was discharged, and the temperature settled. There-

after, recovery was rapid. The Wassermann, Kahn and gonococcal complement fixation tests were all negative.

Histological examination of the specimens removed showed a normal Fallopian tube, a normal corpus luteum and abscess formation in an acutely inflamed ovary. The appendix, apart from some increase in inflammatory cells in the submucosa, was normal.

The patient was followed-up after her discharge from hospital and was last seen 6 months after operation. She stated that she had been very well and had no complaints. Menstruation was regular, normal in amount and there was no pain. The uterus and left appendage appeared normal on pelvic examination.

Discussion

Lennon (1949) has reported 2 cases of acute salpingitis in pregnancy, and in his review of the literature observed that in the main only French gynaecologists had recorded previously the occurrence of such a condition, and then only in the first few weeks of pregnancy. Ovarian abscess during pregnancy is a rarer complication, but a few cases have been recorded.

Aitken (1869) reported a fatal case of peritonitis at the seventh month of pregnancy, due to the rupture of a small intra-ovarian abscess during premature labour. At autopsy there was no evidence of endometritis or of inflammation in either Fallopian tube. Ohman (1913) operated on a patient 6 months after confinement, and found a left ovarian abscess the size of a goose-egg with a normal healthy Fallopian tube. The organism concerned was a streptococcus. He considered, from the history, that the condition had developed 7 days after a spontaneous term delivery. Brindeau (1917) reported a fatal case of peritonitis which developed immediately after a full-time normal confinement. On the second day of the puerperium laparotomy was performed and the only lesion found was multiple abscesses in the right ovary.

Black (1936) in a study of 105 cases of ovarian abscess noted that, in 95 per cent of cases, the organism was a streptococcus. Infection in his cases was either haematogenous from parotitis, typhoid, influenza, septic tooth, etc., or by contiguity of tissue from other infected organs. He considered that blood borne infection of the ovary was the exception, and did not believe that infection of the ovary occurred through lymphatics of the uterus.

The source of infection in this case was difficult to trace. It could not have occurred from the right Fallopian tube, as the histological examination of this revealed a normal mucosa. Similarly, direct spread of infection from the appendix could be excluded, as this organ showed no evidence of an acute infection. There was no history which would even suggest a previous attack of appendicitis. One would expect some adhesions to an ovary so acutely inflamed, particularly with an appendix situated in the pelvis. The patient denied the possibility of any criminal interference, and for that matter was very anxious for another child.

The infecting organism in this case was an anaerobic streptococcus, and it is interesting to note that in the only other case (Ohman 1913) of ovarian abscess associated with pregnancy, where the organism was stated, a streptococcus was isolated. Anaerobic streptococci are known to be normal inhabitants of the bowel and vagina, but why they should infect the right ovary remains obscure. The patient admitted that coitus had taken place 3 days before the onset of pain, and it is possible, though unlikely, that this was responsible for a transient bacteraemia which resulted in a blood borne infection of the ovary. If blood borne, why in only one ovary? It

is also strange that the infection did not involve the corpus luteum, which is not infrequently the seat of abscess formation, although according to Black (1936) infection of this structure is due only to direct contact with infected tissue.

At operation it was not thought necessary to conserve the right ovary and Fallopian tube, as these appeared at the time to be grossly diseased and it was realized that the function of the corpus luteum at this stage of pregnancy would normally be undertaken by the placenta. It is, however, quite possible that, had the abdomen been closed immediately without removal of the right appendages, and adequate chemotherapy and antibiotics given, the patient would have made an equally satisfactory recovery.

I wish to thank Professor H. J. Drew Smythe for permission to publish this case.

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A CASE OF OVARIAN PREGNANCY

BY

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WITH Martin, in 1923, I published a case of ovarian pregnancy. Since that year, I have not encountered a case worth publishing. This one is, I think, if only for statistical purposes.

As recently as February 1950, descriptions of 2 cases appeared in this Journal in which the total of authentic cases was recorded (Ismail, 1950; Toplack, 1950). There is, therefore, no need to discuss its incidence.

Particulars regarding the present case are as follows:

History. The patient, aged 26, had been married for 7 years. There were 2 children, the last confinement being in 1949. The last normal period was on 10th–17th October, 1950. She was admitted to a hospital on 23rd October, 1950, on account of backache and pain in the left side, and was dismissed on 1st December, having had no operative procedure.

She had haemorrhagic vaginal discharge from 30th November to 15th December, 22nd to 31st December, 1950, and from 7th January, 1951, until admitted to my wards on 28th January as an urgent case suspected of having an ectopic pregnancy, although not acutely ill. The diagnosis was based on tenderness in the left fornix, but the tenderness prevented a satisfactory examination. The uterus and right adnexa, in so far as palpable, appeared normal.

Operation. Laparotomy was carried out on 29th January. A haemorrhagic mass, about the size of a hen's egg, was found lightly adherent to the back of the left broad ligament. This was separated and, with the Fallopian tube, was removed (Fig. 1).

There was not any blood in the peritoneal cavity. The uterus, right Fallopian tube and ovary were normal. There was not a corpus luteum in the right ovary. The ligament, from the uterus to the left ovary, had its correct relationship. The left Fallopian tube, other than being slightly stretched over the mass, was quite normal in appearance.

After fixation the specimen was split from its dependent pole to the mesovarium, leaving sufficient ovarian tissue to hold the halves together. By luck, the incision bisected the gestation sac (Fig. 2). The tube was left in correct relation to the posterior (upper half) in the illustration. From this half, a block for sectioning was taken, extending from the gestation sac to the surface of the ovarian tissue. Its orientation is clear in Fig. 2.

In the anterior half (lower in illustration), the sac and embryo are visible.

Histology. Sections from the block removed show clearly, from within out, amniotic membrane and chorionic layer with villi projecting into the blood clot. Many villi are seen in the blood clot between the chorion and the ovarian tissue. The state of preservation of these seems to deteriorate from the gestation sac to the ovarian tissue.

No direct attachment of trophoblast to ovarian tissue is evident in the sections from the limited area examined. It might be demonstrated by serial sections, but at the expense of destroying a beautiful naked eye specimen. Nothing comparable with decidual change was seen in the ovarian tissues.

No lutein change is recognizable in the wall of the implantation cavity. The section, taken at random, is not of value in deciding whether this is an example of surface implantation, or of fertilization of an ovum before release from its follicle A cross section of the tube, near the fimbriated end, showed it to be normal, neither congested nor having any blood in its lumen.

FIG. 1

Photograph of left tube and ovary after removal. Posterior view.

FIG. 2

Specimen split as described in text. The posterior half is folded upwards and with it the Fallopian tube.

D.M.

The embryo, easily recognized by the naked eye, being dead some time, would be valueless for embryological study.

It appears to me that the survival of an ovarian pregnancy, which is in a completely wrong nidus, depends on the effused blood (haemotrophe-rabbit) (Bryce, 1937). The bleeding eventually floats off the chorion and its villi from their attachment. Even then, although the ovum is already dead and the blood is not circulating, the trophoblast remains remarkedly well preserved.

I am not asking the Journal to publish photomicrographs. Any one specially interested can have a section of the block examined by applying to me.

I have to thank Mr. Pearson, senior technician at the Royal Samaritan Hospital, Glasgow, for the photographs of the specimens.

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RUPTURE OF THE UTERUS IN EAST AFRICA

A Note on its Incidence and Aetiology in Women of the Kikuyu Tribe

BY

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BETWEEN mid-September 1947 and October 1950 33 cases of rupture of the uterus were seen at the Government African Hospital, Kiambu, Kenya, amongst women of the Kikuyu tribe.

The incidence of rupture of the uterus, i.e., the ratio of cases of rupture to total live-births and stillbirths, for 1948 and 1949 is as follows:

	Live-births and still-births	Rupture of uterus	Incidence
1948	1023	11	1 in 93
1949	1188	8	1 in 148.5
1948 and 1949	2211	19	1 in 117.4

In this series of 33 cases, a more detailed account of which has been submitted to the *East African Medical Journal*, rupture of the uterus presented itself as follows:

Group 1. Rupture of uterus discovered on admission; presentation before rupture not ascertainable; 11 cases.

These patients were brought to hospital by ambulance, as emergencies occurring in the course of labour.

Group 2. Shoulder presentation; 8 cases. This group was subdivided as follows:

(1) Spontaneous rupture with shoulder presentation. ("Neglected transverse.")
(2) Rupture discovered after obstetric manipulations in hospital.
(3) Rupture discovered at autopsy, after obstetric manipulations in hospital.

Group 3. After forceps delivery or craniotomy; 3 cases.

Group 4. Associated with hydrocephalus; 2 cases.

Group 5. Rupture through scar of previous Caesarean section; 2 cases.

Group 6. Spontaneous rupture in vertex presentation; 7 cases. This group was subdivided as follows:

(1) Rupture before admission.
(2) Spontaneous rupture in hospital.
(3) Spontaneous rupture in hospital associated with subtertian malaria.
(4) Spontaneous rupture causing symptoms after normal delivery of live baby and placenta at home.

Two conclusions can be drawn, namely: (1) the incidence of rupture of uterus in Kikuyu women is high, and (2) whilst the proportion of ruptures following Caesarean

* We are indebted to Honourable Director of Medical Services, Kenya, for permission to publish this paper.

section is low (6.1 per cent), the proportion of spontaneous rupture is high.

In Canada and the United States, the incidence of rupture of uterus is far lower, viz., between 1 in 1,000 and 1 in 3,000 deliveries, in series recorded by Delfs and Eastman (1945), Morrison and Douglass (1945), Lynch (1945), Fitzgerald, Webster and Fields (1949), Watt (1950) and Brierton (1950): In fact, Brierton's 57 cases of rupture were collected during 14 years from more than 110,000 deliveries. Broadly speaking the above authors found that rupture of the scar of a previous Caesarean section was more common as a cause of rupture of uterus than in our series; and spontaneous rupture a less common cause. Watt had 1 spontaneous rupture in his series of 15 cases and this occurred in a woman who had been given pituitrin, and whose baby weighed 11½ pounds and was described as a "moderate hydrocephalic". Brierton found that rupture through the scar of a previous Caesarean section was the commonest cause in his series of 57 cases and next came spontaneous rupture due to other causes. In the American series of rupture of uterus reported by Fitzgerald, Webster and Fields (1949), in 23 white and 19 coloured women, examination of their case-histories showed that obstetric trauma was a commoner antecedent cause in white women; but that vague antecedent causes, such as "prolonged labour and probably disproportion", "defect in fundus of uterus" and "unusually severe contractions and/or rapid labour" appeared oftener in case-histories of coloured women. These vague antecedent causes probably mask spontaneous ruptures. Does rupture in fact differ in its causation in coloured and white women? In the series reported from Peiping by Whitacre and Fang (1942), the high incidence of rupture of uterus of 1 in 95 with the low proportion of rupture through the scar of a previous Caesarean section of 6.8 per cent resembles in both features our East African series and differs from the Canadian and American series. Of 44 ruptures in the Chinese series, 12 were due to contracted pelvis and 9 of these were said to be due to osteomalacia. Ten of the 12 cases were spontaneous ruptures before admission to hospital.

At least 7 of our East African series were known to be spontaneous. In other words, the presentation was vertex; delivery had not been attempted by forceps or craniotomy; nor had there been a previous Caesarean section. Further, the parity of these 7 strictly spontaneous cases lay between 3 and 9, and they gave previously normal obstetric histories. Why should spontaneous rupture occur during a short labour in a multipara with a previously normal obstetric history?

In seeking for the cause or causes of this high incidence of spontaneous rupture of the uterus amongst Kikuyu women, we may study their tribal customs and characteristics. First, they are vegetarian; they seldom eat meat and milk is reserved for children. (In passing, it may be mentioned that their young children suffer from a severe form of protein deficiency, known as malignant malnutrition or "kwashiorkor".) Secondly, Preston (1942) basing his observations on a large number of height and pelvic measurements at Fort Hall, finds the average Kikuyu woman to be somewhat diminutive in height and to have a miniature or funnel-shaped pelvis which is likely to cause a delayed or obstructed labour. He is further of the opinion that most Kikuyu women have a more rapid labour than European women. He gives measurements based on the examination of 700 Kikuyu babies and considers that the moulding of the skull in the Kikuyu foetus is much greater than that of the European

and that there is a great deal of over-riding of bones of the foetal skull. Thirdly, Kikuyu girls at puberty undergo circumcision (removal of clitoris and labia minora). Our experience at Kiambu confirms Preston's view that if circumcision scars give rise to delayed or obstructed labour the latter can generally be overcome by episiotomy. Fourthly, Preston emphasizes that Kikuyu women act as beasts of burden. A load is supported by means of a leather strap, passing over the skull in the region of the coronal suture, the load itself resting on the back, from the mid-dorsal to the lumbo-sacral region. They start carrying these loads at an early age and girls of 6 years and less may sometimes be seen carrying an infant by this method. The loads carried are often very heavy, consisting of big bundles of firewood, and prevent the women from maintaining the erect posture, especially when they are walking uphill. Further, when a woman's scalp is shaved, it is often possible to see a furrow on the scalp, corresponding with a groove in the bony skull, which can be felt. If such stresses can alter the shape of the skull, may they not do likewise to the bony pelvis? So much for their tribal customs and characteristics.

We must now briefly examine the possible bearing of other factors in aetiology. First, parity: all our patients were multiparae, with the single exception of one of the two cases of hydrocephalus. Secondly, pituitrin: though some authors stress the misuse of pituitrin during labour, at this hospital pituitrin is never given until after delivery of the placenta. Thirdly, toxaemias: established eclampsia is uncommon amongst the Kikuyu of this district, only one case having been treated in this hospital during the past 3 years, and toxaemias are rare. Fourthly, cervical tears: some authors mention the possibility of rupture of the uterus starting by upward extension of a high cervical tear from a previous labour. Cases of high cervical tear have certainly occurred in Kiambu Hospital during the past 3 years. Three of these were fatal, because the tear was too high to be adequately sutured vaginally and packing did not control haemorrhage. Autopsy, however, was not performed on these 3 cases to determine whether the tear had extended into the lower uterine segment. On the other hand, the site of rupture of the uterus in our series was most often transverse, at the junction of upper and lower segments. Fifthly, rainfall: in this district, there are two rainy seasons, "long rains" from April to June and "short rains" from end of October to mid-December. During the rainy seasons there is an increased incidence of malaria. During the rainy seasons, too, women carry heavier loads of firewood on their backs. We failed, however, to find a relationship between monthly admissions for rupture of uterus and malarial case incidence or monthly rainfall figures. Admissions for rupture of uterus appear to "come in runs". Sixthly, pendulous abdomen: it is well known that Kikuyu women have a great tendency to anterior uterine obliquity with flabby abdominal musculature and pendulous abdomen. The anterior uterine wall lacks support and may be more vulnerable. In our East African series, the lower anterior wall was the most favoured site for rupture of the uterus.

Can load-carrying "crowd" the bones of the immature pelvis? Even so, why should trouble start in a woman with a previously good obstetric history, unless load-carrying in some way in the intervals between pregnancies could diminish one of the internal diameters of the pelvis? Or, can load-carrying lead to spondylolisthesis? Dr. Hopkirk, the radiologist (1949) has not found a high incidence of spondylolisthesis amongst Africans in

Nairobi. Only a radiological survey could determine the importance of these factors.

Alternatively, is the uterus unduly friable? Mr. Victor Bonney used to preface his lecture on prolapse at the Middlesex Hospital, with the observation that everyone has "some shoddy in his or her make-up." Even in our cases of conditioned rupture, e.g., in neglected transverse presentations and following internal versions, we have the impression that the uterus ruptures more easily and after a shorter period from the onset of labour than in the European or Luo African. The uterus appears to be unduly friable and greater care has to be exercised when doing versions. The Gillmans (1947) produce experimental evidence that rats fed on certain deficiency diets become more liable to rupture of uterus. They think that nutritional factors may be of importance in rupture of uterus in some women.

Further details, with case histories, will be published in the *East African Medical Journal*. Twenty-one of the 33 cases were submitted to laparotomy and repair of uterus; of these, 12 recovered, 9 died. Four were submitted to laparotomy and repair of uterus with tubal sterilization; of these, 3 recovered, 1 died. Six were submitted to sub-total hysterectomy; of these, 2 recovered, 4 died. Two cases not submitted to operation for rupture died. Of total 33 cases, 17 recovered, 16 died. We are of the opinion that, if blood is not available for transfusion, laparotomy and repair of uterus (with tubal sterilization, only if time allows) is a less shocking operation than removal of the puerperal uterus.

Summary

The incidence of rupture of uterus amongst Kikuyu women at the Government African Hospital, Kiambu, is 1 in 117.4. Thirty-three cases have been treated between mid-September 1947 and October 1950. A high proportion of ruptures occur spontaneously.

The aetiology is discussed with particular reference to the Kikuyu method of carrying loads.

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INSTRUMENT FOR GASTRO-INTESTINAL ADMINISTRATION OF OXYGEN IN ASPHYXIA OF NEWBORN

BY

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THE gastro-intestinal administration of oxygen for the treatment of asphyxia in the newborn is being increasingly practised.

The usual procedure is to pass two catheters into the stomach. Oxygen is insufflated via one at the rate of 3 to 4 litres per minute, the second acting as a safety valve, preventing over-distension of the intestines.

This method has several disadvantages:

(*a*) One of the tubes may lie in the stomach and the other in the oesophagus.

(*b*) If the tubes are too soft they do not pass readily but tend to curl up.

(*c*) If the tubes are too rigid they may perforate the stomach or oesophagus.

(*d*) In the premature infant, the bulk of the two catheters may be too large, compress the trachea and embarrass the respiration once it becomes established.

Those who practise this procedure can easily overcome these disabilities. A 24-inch length can be cut from an old Miller-Abbott tube. The distal end is sealed off. One or two holes are made in both channels near the top. The proximal end is fitted with the usual Miller-Abbott fitting. Oxygen is insufflated through the inlet nozzle, and led off through a catheter attached to the outlet nozzle, the distal end of this catheter lying in a kidney dish full of tap water.

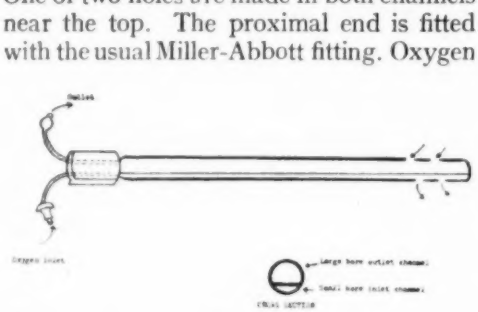

FIG. 1

This tube is of solid enough consistency to enable it to be easily passed within a matter of seconds, with a minimal disturbance to the infant while it is lying in a cot. It is not rigid enough to permit perforation of soft structures even in the most inept hands. It is thin enough to avoid compressing the trachea. There is no possibility of one opening lying in the stomach and one end in the oesophagus.

Once respiration is established the tube can be gently withdrawn till the end lies in the naso-pharynx and oxygen supplied to the lungs with no further disturbance of the infant. This is not written to advocate intragastric insufflation for asphyxia neonatorum, but merely describes a safer technique than those currently in use.

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ENTERITIS NECROTICANS COMPLICATING PREGNANCY

BY

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IN recent years there have been a number of reports of a localized form of enteritis due to anaerobic organisms. This has been given the name of "enteritis necroticans". The following case would appear to be one of this type complicating pregnancy. We have not been able to find any reference to a similar condition occurring in pregnancy.

CASE REPORT

Mrs. R., aged 41 years, para-9, was admitted to hospital on 8th May, 1950, because of hydramnios and a hydrocephalic foetus. She had attended the out-patient department from 30th January, when she was 16 weeks pregnant. She was quite healthy apart from anaemia, her haemoglobin being 54 per cent. She was given a course of intravenous iron but developed pyelitis which interfered with her response to treatment. She also complained of sickness and anorexia at this time. Under treatment with alkalies the infection subsided and by 17th April her haemoglobin had risen to 66 per cent. On 1st May it was apparent that her abdomen was much larger than expected and an X-ray examination revealed a hydrocephalic foetus. She was admitted on 8th May. During the week prior to admission sickness had become more frequent and troublesome. Subsequently her relatives stated that she had vomited dark-brown and black material frequently during the previous fortnight.

Apart from scarlet fever in childhood she had been healthy. Her obstetric history was normal. She had 8 previous pregnancies all normal with full-time deliveries after short labours. Seven of the children were alive and well. The eighth died at the age of 5 months of gastro-enteritis.

On admission her condition was satisfactory. There was no oedema, jaundice or cyanosis. The temperature was 97.2°F., the pulse 102 per minute and the respirations 20 per minute. Blood-pressure measured 135/85.

The uterus was enlarged to the size of a full-time pregnancy, with the vertex presenting but free above the brim of the pelvis. There was a well-marked fluid thrill. The urine contained a trace of albumen and acetone and numerous polymorphs. On 9th May the temperature rose to 100.2°F. and the pulse was 108 per minute. Sulphadiazine, 1 g., was given 4-hourly. In the evening she vomited 18 ounces, but there was no sign of altered or fresh blood. There was slight intermittent pyrexia during the next few days and the pulse rate was elevated throughout. On 12th May some streaks of fresh blood were noted in the vomitus. The temperature was sub-normal at this time but the pulse remained over 100 per minute.

Vomiting recurred on 13th May, and in the evening she had a haematemesis (3 ounces) which was repeated at 9 p.m. The following day, 14th May, she had frequent small haematemeses. She now complained of epigastric pain and was unable to tolerate much fluid by mouth. A stomach tube was passed in the evening and after withdrawal pure blood returned and the patient vomited a large clot. She now appeared to be slightly jaundiced. Her pulse rate was now 144 per minute and the temperature was 99.4°F. Haemoplastin, 2 ml., was given at 8.45 p.m. Morphia had been

given repeatedly since her first haematemesis. Her haemoglobin dropped from 65 per cent at 9 p.m. to 58 per cent at 12 midnight. During the night there was diarrhoea and the stools were tested for occult blood with a positive result. The faeces were examined bacteriologically but none of the usual intestinal pathogens could be isolated. The general condition of the patient deteriorated and in the mid-morning, 15th May, she was collapsed with an imperceptible pulse. One pint of plasma and 3 pints of blood were given. Her condition was much improved and labour was induced by rupturing the membranes in the evening. At 8 p.m. the patient was fully dilated and under a general anaesthetic the foetal head was perforated with Simpson's perforator and the delivery completed with Willet's forceps. Blood loss was insignificant. Following delivery the patient's condition was reasonably satisfactory although the pulse remained rapid, around 120 per minute. At 1 a.m., 16th May, however she had a further haematemesis, 15 ounces of fresh blood, and her temperature rose to 100.4°F., and her pulse-rate increased to 132 per minute. Her pulse-rate continued to rise during the next few hours and she became delirious. Three hours after the haematemesis her temperature was 105.6°F., and her pulse-rate 160 per minute. She became incontinent of faeces and jaundice was now definite. Continuous oxygen was given and coramine injected intravenously, but she was now severely collapsed. Catheterization produced 17 ounces of highly concentrated urine. Intravenous 5 per cent glucose saline was given to combat the dehydration produced by the diarrhoea and in all she received 3 pints during the day. Despite treatment her general condition deteriorated. There was profuse diarrhoea and incontinence. Her pulse-rate became uncountable and her temperature hovered around 104–105°F. Around 8 p.m. her breathing became very laboured and cyanosis was marked despite continuous oxygen. Coramine was again administered intravenously, but without effect and the patient died at 9.5 p.m.

Postmortem at 11 p.m., 16th May.

The body is that of a well-built middle-aged female showing signs of a recent pregnancy. There is marked cyanosis of the whole body.

The heart (350 g.) is of average size. There is some agonal clot in the right ventricle but the most striking feature is the frothy blood which fills this cavity and the pulmonary arteries. The valves are competent but there is a tiny recent vegetation on the auricular aspect of the posterior flap of the mitral valve. A splash of subendocardial haemorrhage is present over one of the papillary muscles of the right ventricle. The left ventricle is empty. No abnormality can be seen in the coronary arteries.

Both lungs are intensely congested and oedematous (R.: 1750 g.; L.: 1650 g.). A well-defined bronchopneumonia is present in the lower lobes of both lungs but it is more advanced on the right side.

No sign of ulceration can be seen in the stomach although the mucosa is congested. The mucosa over a large part of the cardiac end is raised and is actually floating on an underlying gaseous layer which can be pressed from one part of the stomach to another. In the second part of the duodenum the mucosa is acutely inflamed with several tiny haemorrhagic points. Parts of the mucosa are raised one-half to three-quarters of an inch above the surrounding surface by bubbles of gas. These raised patches tend to run circumferentially. The largest patches are 2 inches long, by ½ inch wide, and involve the whole circumference of the bowel (Fig. 1). This patchy gas formation continues down the jejunum for approximately 3 feet, the whole wall of the bowel being acutely inflamed. The adjacent lymph glands are swollen and congested. No change of any significance can be seen in the ileum or large intestine but in the mesentery near the ileo-caecal junction there is a large mass of partially calcified glands measuring approximately 4 by 3 by 1½ inches.

The liver (2,800 g.) is greatly enlarged and very pale apart from a few patches of congestion towards the free edge. The gall-bladder is distended with thin greenish bile.

The spleen (350 g.) is also enlarged and the general pallor of the soft pulp masks all structure.

Both kidneys are enlarged (R. 320 g.; L. 225 g.). There is a moderate degree of hydronephrosis on the right side. Both kidneys are pale but in the cortex there are areas of congestion and haemorrhage and in one or two places small abscesses are present. The mucosa of the pelves is injected. Both ureters are moderately dilated. Purulent

FIG. 1

Photograph of pyloric region of stomach and first part of duodenum. Arrow indicates area of gas formation running transversely.

urine is present in the bladder, the wall of which is congested.

The fundus of the uterus is at the level of the umbilicus and it is rather flabby. It contains a large amount of blood clot forming a fairly uniform layer over the whole internal surface one inch thick. There is no sign of inflammation. The ovaries are normal.

No abnormality can be seen in the brain and the pituitary gland appears to be healthy. Tissue was taken from the liver, kidney, intestine, lung, and uterus for microscopical examination. A section was also made from the vomited clot.

Histology

Liver. There is an occasional patch of fatty infiltration in the parenchyma. This has no particular distribution and as it is found frequently at postmortems on pregnant subjects it is probably to be regarded as normal. One or two radicles of the portal vein are thrombosed and small clumps of bacteria are present in these vessels. The organisms are apparently all Gram-positive cocci.

Kidney. There is a widespread pyelonephritis on both sides but the inflammation is of long standing and much of the change is of a chronic nature. There are many areas of scarification with lymphocytic infiltration. Small abscesses are present but they are of a subacute nature. A few Gram-positive cocci are present.

Lung. There is a widespread oedema of the lung interspersed with patches of bronchopneumonic inflammation. Small clumps of Gram-positive cocci are present in the alveolar exudate.

Uterus. No gross abnormality can be found in the uterine tissue on microscopical examination. Thrombosis, the normal prelude to involution, has occurred but there is no evidence of infection.

Jejunum. There is almost complete necrosis of the mucosa. A few Gram-positive cocci are present in the superficial tissues. The most dramatic changes, however, have occurred in the submucosa and muscularis. In many parts the submucous tissue has disappeared and the surrounding mucosa and muscularis are pressed outwards by what are obviously bubbles of gas. The same appearance can be seen in parts of the muscle coats. In surrounding areas where gas formation has not taken place silver preparations show that the fine reticulin fibres are fragmented and in process of disappearing. Sections stained by Gram's method reveal a mixed bacterial flora in the areas of gas formation and extending along the tissue planes. For the most part the bacteria consist of small Gram-positive cocci, sometimes in short chains, and Gram-positive bacilli.

The bacilli are not strongly Gram-positive. They are stout rod-shaped organisms with rounded ends. In some parts they are rather long, 6μ, and are very occasionally slightly curved. No spores can be seen. Morphologically they resemble *Clostridium welchii*. Local lymph glands are oedematous and the sinusoids are full of degenerate polymorphs and mononuclears although it is characteristic of the intestinal lesions that no cellular reaction can be seen.

Sections made of the vomited blood clot reveal small masses of organisms similar to those seen in the intestinal wall.

Commentary

The symptomatology in this case is very similar to that reported in cases of enteritis necroticans due to *Cl. welchii* type F (Zeissler and Rassfeld-Sternberg, 1941; Fick and Wolken, 1949; Calnan, 1950). These authors all emphasize the afebrile nature of the disease despite the ill appearance of the patient. Repeated vomiting with melaena and haemorrhage appear to be characteristic. In the present instance the temperature was raised slightly for a few days but this was insignificant in contrast to the increase in pulse-rate and the general condition of the patient. Although there was no actual ulceration of the intestinal tract the distribution of the lesions in our case correspond fairly closely with that described by the authors mentioned above.

Unfortunately bacteriological evidence was not obtained during the life of the patient but since the postmortem was carried out very shortly after death it seems extremely unlikely that the changes in the intestine were due to postmortem invasion of the tissues by the clostridia found in the submucosa of the stomach and intestine.

SUMMARY

1. A fatal case of gastro-enteritis complicating pregnancy is described.

2. The lesions were confined to the stomach, duodenum, and jejunum and consisted of an inflammatory lesion in the submucosa associated with gas-formation in the tissues.

3. The disease appeared to have an insidious onset with vomiting and repeated small haematemeses. It pursued a relatively afebrile course despite the marked illness of the patient.

4. Histological examination of the affected tissues showed the presence of organisms of clostridial type in the submucosa.

We would like to thank Professor R. A. Lennie for permission to publish this case.

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ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS

A meeting of the Council was held in the College House on Saturday, 28th July, 1951, with the President, Dame HILDA LLOYD, in the Chair.

The following Officers were re-elected:

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Gerald Joseph Amiel
David Leonard Arnold
Kenneth Baker
James Stevenson Barr
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Robert McFarlane Bernard
Robert Brown
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Helen Angela Cawson
Lydia Colaco
Francois Daubenton
Charles Henry De Boer
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Joseph Firth
Charles Macintosh Flood
Joseph Gardiner
John Francis Cardross Grant
Robert George Hibberd Hall
David Hay
Stanley Ray Hewitt
Peter Francis Clavering Jackson
David Henry McGrath
Donald MacVicar
Kazimierz Antoni Makos
Reginald Tice Martin
John Knox Morrison
Margaret Bonney Noble
John Kenworthy Ogden
Henry Roberts
Heather June Sylvia Ross
Gamal El Din Mohamed Kamel Sami
John Chalmers White Somerville
Norman Graham Guy Talbot
John Mervyn Thomas
Richard Radford Trussell
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Marion Williams
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Alan Lacey Hellestrand
Stanley Ray Hewitt
David Henry McGrath
Donald MacVicar
Kazimierz Antoni Makos
Regina'd Tice Martin
John Knox Morrison
John Kenworthy Ogden
Henry Roberts
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Gamal El Din Mohamed Kamel Sami
John Chalmers White Somerville
Norman Graham Guy Talbot
John Mervyn Thomas
Richard Radford Trussell
Archibald Cameron Hele Wensley
Marion Williams
Lawrence Willoughby
Abd Elmonem El Sayed Abou Zikry

List of Candidates who have been awarded the Diploma in Obstetrics:

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Audrey Kathleen Arnold
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Robert Henry Bolton
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Peter Hayne Bright
Geoffrey Winspear Burton
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Hugh Edwin Richard Chew
Ruth Eluned Chivers
Kenneth Richard James Coates
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Frances Mary Cottam
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Raymond James Davis
Rodney Edmund ffrench Devitt
Thomas William Gibson Donohoe
Desmond Mayse Downing
Audrey Elizabeth Draycott
Robert Vivian Dugdale
Brian Herbert Du Heaume
René Eminyan
Harold Cecil Endbinder
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Kathleen Maureen Clare Haigh
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Geoffrey Ernest Haward
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Michael William Sharp
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Mario Tua
John Kitching Tully
Joseph Achilles Verzin
Joseph Noel Ward
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Jean Margaret Isabel Watson
Mary Borlase Watson
Robert Gordon Watson
William Frederick Watson
Geoffrey Brian Whitaker
Molly Thérèse Williams
William John Wood Wolfe

BOOK REVIEWS

"A Short Textbook of Midwifery." By G. F. GIBBERD, M.B., M.S., F.R.C.S., F.R.C.O.G. Messrs. J. & A. Churchill, Ltd., London, 1951. Pp. 559, illustrations 199; price 25*s*.

THE appearance of a new edition of a well-established textbook is always a matter of interest, for we have an opportunity to see the evaluation of new trends through the eyes of its author. We find that the section on the treatment of placenta praevia has been recast to give more scope to expectant treatment and the ultimate employment of Caesarean section, though many would regret Mr. Gibberd's still unconverted preference for the classical operation. The long chapter on puerperal infections is wisely retained, for here we have the author on his own subject, and a sound basic knowledge of the pathology and bacteriology of puerperal infection is as essential to the proper control of sepsis as is a good grounding for physiology to the study of pathology in general. One feels that the victory of the antibiotics, while it yet resounds, may soon become a "withdrawal to prepared positions" before a bacteriological counter-attack.

It is, perhaps, regrettable that the term "albuminuria of pregnancy" has not yet been supplanted by the more usual "pre-eclamptic toxaemia," and many modern authorities would not agree with protein restriction in these cases. Salt restriction is not mentioned, nor is the use of rectal "avertin" in eclampsia.

Other points are worthy of note. The section on tuberculosis has been rewritten so as to present the modern outlook. The term "contraction ring" is still used in preference to "constriction ring." The estimate of 50–80 per cent replacement in exchange transfusion is probably a pessimistic one, and the statement that the infant's Rh blood group can be changed from positive to negative is misleading.

But the proof of the value of this book is surely that since it was first produced in 1938, new editions have regularly made their appearance.

"Antenatal and Postnatal Care." By FRANCIS J. BROWNE, Emeritus Professor of Obstetrics and Gynaecology, University of London. Seventh edition. J. & A. Churchill, Ltd., London, 1951. Pp. 703, illustrations 94; price 30*s*.

THIS new edition of Professor F. J. Browne's well-known book maintains the high standard of its predecessors. The last edition appeared in 1946 and the present volume contains many changes and additions, including a new chapter on Acute Infectious Fevers in Pregnancy.

When it first appeared in 1935 *Antenatal and Postnatal Care* quickly established for itself a primary place on the shelves of the obstetrician. Throughout the years, and in rapidly succeeding editions, it has securely held this place and it has now become an essential part of the library of the student and practitioner.

Like so many other books which necessarily grow in size with the passage of time this book tends to suffer from inadequate pruning. Views and theories which were topical and even important fifteen years ago are often now of little consequence. As an example of this we may cite the reference to the long-discarded view of Morse (p. 287) that torsion of the uterus is a frequent cause of accidental haemorrhage.

It is strange to find, on the contrary, that despite the large amount of attention recently paid to the anuric syndrome frequently met with in concealed accidental haemorrhage Professor Browne's book does not even mention it. There is no reference to "Anuria" in the Index.

" The Fertile and Infertile Days of Women and Their Definite Calculation." By HERMANN KNAUS, M.D. Herbert E. Budek Company, Inc., New Jersey. Pp. 50, illustrations 14; price $1.90.

THIS short book is intended as a means of instructing women in regard to the " safe period " and the days of fertility in the menstrual cycle. It is the outcome of many years of detailed investigation by the author.

Beginning with a simple explanation of the physiology of the menstrual cycle, the signs of ovulation, and the morning temperature record, it then goes on to discuss the determination of the " safe period." The whole basis of this work is that while the pre-ovulatory phase is of slightly variable length, the life of the corpus luteum is always 14 days, and that the daily temperature chart is a reliable guide to the time of ovulation. Farris's work with Wistar rats suggests that these assumptions are not entirely reliable, but one cannot doubt that in the vast majority of cases Professor Knaus's rule holds good, and that it can be effectively used in family limitation.

The book is well produced and easily readable, though here and there one may find traces of Germanic idiom preserved by the translator. A menstrual calendar is included.

" Physiotherapy in Obstetrics and Gynaecology." By HELEN HEARDMAN. E. & S. Livingstone, Ltd., 1951. Pp. 217, illustrations 94; price 16s. net.

THERE is a growing support in this country for the teaching of Dr. Grantly Dick Read. This book is by one of his earliest followers, the late Mrs. Heardman, who was largely responsible with Dr. Read for the elaboration of the practical principles of " natural childbirth."

The book is intended for physiotherapists, and commences with a concise description of the anatomy of the female reproductive system and the mechanisms of labour. A short chapter on the physiology of reproduction is followed by an account of the attitude to the pain of childbirth throughout the ages. The instructions for the preparation for labour are given in a clear style and are accompanied by excellent illustrations.

At the end of the section on obstetrics the author has drawn comparisons between patients receiving antenatal tuition and those not prepared.

Several important matters are touched upon in the chapter on gynaecology, and the ways in which the physiotherapist can help the patient. The routine postoperative treatment is described and important emphasis is laid on the preoperative breathing exercises, so that after the operation the patient may gain confidence in the use of her abdominal muscles.

REVIEW OF CURRENT LITERATURE

The Journal is fortunate in being able to run this Review in conjunction with the Abstracting Service of the British Medical Association. All the abstracts of this service which cover obstetrical and gynaecological literature and literature on the new-born are at our disposal. The Review will, however, contain in addition abstracts and titles of articles which, though not of sufficient general interest for publication in the monthly volumes published by the British Medical Association, are yet sufficiently important for a specialist journal.

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ANATOMY

1988. **Measurements of the True Conjugate Diameter Controlled at Subsequent Caesarean Section.** (Vysledky röntgenologického merania conjugata vera a jeho kontrola pri cisárskom reze.)

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1989. **The Clinical Manifestations of Disturbances of the Vegetative Nervous System in Cases of Contracted Pelvis.** (Die Erscheinungsformen vegetativer Störungen im Kleinen Becken der Frau.)

By K. HEYROWSKY. *Wien. med. Wschr.*, **101**, 399–402, June 2, 1951. 4 refs.

1990. **Quantitative Morphological Investigations of the Follicular System in Women. Methods of Quantitative Determinations.** [In English.]

By E. BLOCK. *Acta anat., Basel*, **12**, 267–285, 1951. 1 fig., 43 refs.

PHYSIOLOGY

1991. **The Effect of Destruction of the Germinal Epithelium on the Numbers of Oocytes.**

By A. M. MANDL and S. ZUCKERMAN. *J. Endocrinol.*, **7**, 103–111, June, 1951. 3 figs., 16 refs.

1992. **The Relation of Age to Numbers of Oocytes.**

By A. M. MANDL and S. ZUCKERMAN. *J. Endocrinol.*, **7**, 190–193, June 1951. 1 fig., 8 refs.

1993. **The Number of Oocytes in the Mature Rhesus Monkey.** (*Macaca Mulatta.*)

By S. H. GREEN and S. ZUCKERMAN. *J. Endocrinol.*, **7**, 194–202, June 1951. 1 fig., 13 refs.

1994. **The Significance of the Diencephalon in the Vaginal Cycle of the Rat.** (Die Bedeutung des 3. Ventrikelgebietes (Diencephalon) für den Scheidencyclus der Ratte.)

By M. HESS and G. HESS. *Arch. Gynäk.*, **179**, 300–310, 1051. 7 figs., 28 refs.

1995. **Neurohormonal Regulation of Female Genital Function.** (Die neurohormonale Regulation der weiblichen Genitalfunktion.)

By W. BICKENBACH and G. K. DÖRING. *Dtsch. med. Wschr.*, **76**, 504–508, Apr. 13, 1951. 3 figs., bibliography.

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By V. CHUDOBA. *Ceskoslov. Gynaek.*, **30**, 31–36, 1951. 3 refs.

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By G. P. BALASSI and C. RICCA. *Minerva ginec.*, **3**, 103–106, Mar. 1951. 23 refs.

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By J. M. ROBSON and A. A. SHARAF. *J. Endocrinol.*, **7**, 177–179, June 1951. 3 refs.

2003. **Biochemical, Biological, and Cytological Study of a Menstrual Cycle.** (Exploration biochemique, biologique et cytohormonale d'un cycle menstruel.)

By M. F. JAYLE, O. CRÉPY, B. SCHRAMM, S. VANDEI, and O. JUDAS. *Ann. Endocrinol., Paris*, **11**, 545–570, 1950. 8 figs., 15 refs.

The authors have made a detailed study of one complete menstrual cycle in a young woman showing signs of hyper-oestrinization. Urine was collected throughout the cycle in 48-hour samples. Vaginal smears and one endometrial biopsy were performed. Oestrogens were estimated biologically and also chemically (by a modification of the Kober method). The results of the chemical and biological assays paralleled one another so closely that the authors have confidence in the reliability of the former for non-pregnant urines. Assay of 17-ketosteroids was by the method of Cahen and Salter, and of butyl-soluble glucuronidates by the authors' method (*Ann. Endocrinol.*, 1949, **9**, 145).

A rise in temperature and a high level of oestrogen excretion indicated that ovulation occurred about the fourteenth day. The urinary output of oestrogen was increased during the follicular phase, falling immediately after ovulation and rising again to a peak just before menstruation. The daily output of butyl-soluble glucuronidates was fairly constant during the first half of the cycle,

but after ovulation increased for some days. In normal women this rise is maintained until just before menstruation, but in this patient the corpus luteum persisted only for 2 or 3 days and the output of urinary glucuronidates then fell. The vaginal cytology confirmed this insufficiency of the corpus luteum. The daily variation in 17-ketosteroid excretion was slight and unrelated to the events of the cycle. *Nancy Gough*

2004. **Ovarian Function and Vaginal Cytology.** (Funzione ovarica e citologia vaginale.)
By R. TOAFF. *Minerva ginec.*, **3**, 192–194, May 1951. 16 refs.

2005. **The Cytological Significance of Hyperestrinism.**
By E. L. HECHT. *Amer. J. Obstet. Gynec.*, **62**, 135–142, July 1951. 5 figs., 18 refs.

2006. **The Value of the Vaginal Smear in Investigations of the Menstrual Cycle.** (Der Wert des Vaginalabstriches zur Zyklusdiagnose.)
By E. SEIBERT. *Wien. med. Wschr.*, **101**, 518–521, July 14, 1951. 10 figs., 12 refs.

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By V. PROBST and O. A. ROTH. *Med. Welt.*, **20**, 590–592, May 5, 1951. 6 figs.

2008. **Cytometric Variations in the Superficial Epithelial Cells of the Vagina in *Mus decumanus* in Various States of Sexual Activity and Under Experimental Conditions.** (Variazoni citometriche delle cellule superficiali dell'epitelio vaginale in *Mus decumanus* (Pall.), nei vari momenti dell'attivita sessuale ed in condiazioni sperimentali.)
By M. FRANCESCHINI. *Minerva ginec.*, **3**, 149–151, Apr. 1951. 3 figs.

2009. **Transitional Endometrium.** (Overgångsendometrit.)
By B. TÖRNQVIST. *Nord. Med.*, **45**, 972–974, June 20, 1951. 4 refs.

2010. **The Relation between Residual Prothrombin and the Functional Activity of the Blood Platelets during the Menstrual Cycle.** (Sur les rapports entre la prothrombine résiduelle et la valeur fonctionelle des plaquettes sanguines au cours du cycle menstruel.)
By G. OTTOLENGHI-PRETI and B. ROVATTI. *Gynéc. et Obstét.*, **50**, 172–176, 1951. 30 refs.

2011. **The Menstrual Cycle and Ovulation.** (Menstruationszyklus und Ovulation.)
By H. FRANKEN. *Dtsch. med. Wschr.*, **76**, 229–232, Feb. 23, 1951. 1 fig., 20 refs.

2012. **Chlorophyll as a Deodorizer of Lochial and Menstrual Odors.**
By F. S. TABER. *J. med. Soc. N. J.*, **48**, 321–322, July 1951.

PREGNANCY

2013. **Social and Psychological Factors in Maternity.** (Factores psicòlogicos y sociales en la maternidad.)
By J. V. RODRIGUEZ MIRANDA. *Sem. méd., B. Aires*, **98**, 389–390, Mar. 15, 1951.

NORMAL

2014. **The Morphological Changes in the Cervix during Pregnancy, including Intra-epithelial Carcinoma.**
By J. W. W. EPPERSON, L. M. HELLMAN, G. A. GALVIN, and T. BUSBY. *Amer. J. Obstet. Gynec.*, **61**, 50–61, Jan. 1951. 10 figs., 10 refs.

The authors performed biopsy of the apparently normal cervix in 286 women in the antenatal period. Biopsy was again carried out in 214 of these at delivery and in 220 from 4 to 8 weeks postpartum.

The morphological changes in the cervix are discussed under 3 headings: stroma, glands, and epithelium. Under the influence of pregnancy the stroma is modified in 4 ways: (1) An increased vascularity develops which is directly proportional to the duration of pregnancy until at parturition the stroma appears almost angiomatous. (2) An increasing oedema occurs. At delivery there is also an infiltration by erythrocytes. The oedema and vascularity quickly diminish after delivery and in 96 hours the cervix has become practically normal again. (3) Cervicitis becomes prominent and lasts throughout the postpartum period. It was present in 50 per cent of specimens. (4) Decidual reaction occurred in 10.4 per cent of antenatal specimens. It appeared first at the 16th week of pregnancy.

There is a great increase in the number of glands until the entire stroma seems to be filled with glandular tissue. There is an increase in the number of cells lining the glands, so that instead of a single layer there appear to be 3 or more cell layers. Adenomatous hyperplasia occurs so that multiple small gland foci are formed within the larger glands. These are lined by columnar or flattened epithelium.

In approximately 15 per cent of antenatal cases epidermization occurs, the stratified squamous epithelium growing beneath the columnar epithelium of the glands or replacing it. Hyperactivity of the basal layer of the epithelium was found in 14.7 per cent of all the antenatal biopsies. In 2 of these cases the hyperactivity was so marked that in non-pregnant women it would have been called intra-epithelial carcinoma. Both of these appeared normal at postpartum biopsy examination. *F. J. Browne*

2015. **Electrophoretic Studies in Normal Pregnancy and in Prolonged Gestation.** (Elektrophoretische Untersuchungen bei normaler Gravität und Spätgestose.)

By E. GLATTHAAR, H. SUENDERHAUF, and C. WUNDERLY. *Schweiz. Med. Wschr.*, **81**, 592–597, June 23, 1951. 15 figs., 19 refs.

2016. **The Volume of Plasma, Blood and Interstitial Fluid during Normal Pregnancy.** (Objem plasmy, krve a mimobuněčné tekutiny v proběhu normálního těhotenství.)

By V. JAROSOVA and S. DAUM. *Ceskoslov. Gynaek.*, **30**, 36–48, 1951. 5 figs., 21 refs.

2017. **Potassium-calcium Quotient in the Blood of Pregnant Women.** (Weitere Beobachtungen über den K/Ca-Quotienten im Blute Schwangerer.

By E. MUNTAU and P. U. FECHNER. *Zbl. Gynäk.*, **73**, 1016–1020, 1951. 1 fig., 16 refs.

2018. **The Plasma Iron Level during Pregnancy.** (Hladina plasmatického železa a mědi v prubéhu těhotenství.)

By S. DAUM. *Ceskoslov. Gynaek.*, **30**, 48–56, 1951. 3 figs., 11 refs.

2019. **The Antihyaluronidase Activity of the Blood in Pregnancy.** (Sul potere antijaluronidasico del sangue di donna gravida.)

By C. PELLIZZARI. *G. Sci. med.*, **5**, 126–127, July 1950. 4 figs.

2020. **Peptidase Activity in Human Serum in Pregnancy.**

By A. M. CULLEN, V. T. BARBER, M. K. BIRMINGHAM, and K. STERN. *Canad. J. med. Sci.*, **29**, 114–123, June 1951. 1 fig., 18 refs.

2021. **The Levels of Several Metabolites in Blood and Urine During Normal Pregnancy.**

By J. R. BEATON, M. J. CAVAN, R. E. LAU, W. J. MCGANITY, E. W. MCHENRY, and G. L. WATT. *Amer. J. Obstet. Gynec.*, **62**, 156–159, July 1951. 8 refs.

2022. **The Onset of Frequency of Micturition in Pregnancy.** (Ueber den Beginn der Pollakisurie während der Schwangerschaft.)

By E. ENDERLE and T. DIMMLING. *Zbl. Gynäk.*, **73**, 1089–1092, 1951. 1 fig., 2 refs.

2023. **Studies on Renal Function in Man. With Special Reference to Glomerular Filtrations and Renal Plasma Flow in Pregnancy.** [In English.]

By H. BUCHT. *Scand. J. Clin. Lab. Invest.* Suppl., **3**, 1–64, 1951. 3 figs., bibliography.

2024. **An Experimental Study of the Possibility that α-tocopherol in High Dosage may act as Stähler's "Exogenous Hormone" replacing the Corpus Luteum of Pregnancy.** (Le alte dosi di alfa-tocoferolo possono sostituire il corpo luteo gravidico come "ormone esogeno" nel senso di Stähler?)

By M. CARBONNI. *Ann. Ostet. Ginec.*, **73**, 406–424, Mar. 1951. 5 figs., bibliography.

2025. **The Hyaluronidases in Fertilization.** (Las hialuronidases en la fecundación.)

By F. BARQUIN. *Arch. med. S. Lorenzo*, **2**, 185–188, Mar. 1951. 8 refs.

2026. **First Observations of Penetration by the Spermatozoon of the Membrana Pellucida of the Guinea-pig Ovum fertilized *in vitro*.** (Primeras observaciones de la penetración del espermatozoide en la membrana pelúcida de ovocitos de coneja fecundados *in vitro*.)

By R. MORICARD. *Ginec. Obstet. Mex.*, **5**, 407–412, Nov.-Dec. 1950. 1 fig.

2027. **Studies on the Urinary Excretion of "Xanthurenic Acid" During Normal and Abnormal Pregnancy: A Survey of the Excretion of "Xanthurenic Acid" in Normal Nonpregnant, Normal Pregnant, Pre-eclamptic, and Eclamptic Women.**

By H. SPRINCE, R. S. LOWY, C. E. FOLSOME, and J. S. BEHRMAN. *Amer. J. Obstet. Gynec.*, **62**, 84–92, July 1951. 20 refs.

2028. **The Clinical Application of Pregnandiol Estimations in Obstetrical Practice.** (Les applications cliniques du dosage du prégnandiol en pratique obstétricale.)

By M. H. PIGEAUD. *J. Méd., Lyon*, **32**, 611–616, July 5, 1951.

2029. **Clinical Evaluation of the Colostrum Skin Test for Pregnancy.**

By S. M. MARTINS and B. R. HOWELLS. *Ann. west. Med. Surg.*, **5**, 558–560, June 1951. 4 refs.

2030. **Ophthalmotonia in Obstetrics and Gynaecology. (A new Sign for the Diagnosis of Pregnancy.)** (Oftalmotono en obstetricia y ginecologia. Un nuevo signo para el diagnóstico de gestación.)

By W. N. DOMINGUEZ. *Sem. méd., B. Aires*, **58**, 572–577, Apr. 19, 1951. 4 figs., 8 refs.

2031. **The Early Diagnosis of Pregnancy from Heterogenetic Reactions to Proteus OX 19.** (Diagnóstico precoce da gravidez e reações heterogenéticas de proteus OX_{19}.)

By M. I. MELLO. *Hospital, Rio de J.*, **39**, 701–704, May 1951. 12 refs.

2032. **Clinical Experience with the Galli-Mainini Test.** (Kliniske erfaringer med "Maininitesten.)

By C. F. FELDING. *Ugeskr. Læg.*, **113**, 203–205, Feb. 15, 1951.

2033. **Experiences with the Galli-Mainini test, with a Description of a Shortened Technique and its Results.** (Erfahrungen über den Galli-Mainini-Test und Angabe einer verkürzten Methodik und deren Ergebnisse.)

By E. WIENINGER and W. LAKOMY. *Med. Klinik.*, **46**, 439–441, Apr. 6, 1951. 23 refs.

2034. **Breeding and Use of *Xenopus Laevis* in the Diagnosis of Pregnancy.** (Odling och anvandning av *Xenopus Laevis* till graviditetsreaktioner.)

By E. HEDBERG. *Nord. Med.*, **45**, 200–201, Feb. 7, 1951. 10 refs.

2035. **Pregnancy Test on the Common Toad, *Bufo bufo* (s. Bufo Vulgaris.)** Graviditetsreaktion på vanlig padda (*Bufo bufo*).)

By B. JOSEPHSON and A. DETTKER. *Nord. Med.*, **45**, 201–202, Feb. 7, 1951.

2036. **A Comparative Study of the Galli-Mainini's and Friedman Tests of Pregnancy.** (Sammenlignede undersøgelser over Galli Mainini's og Friedman's svangerskabsreaktioner.)

By J. V. THORBORG. *Ugeskr. Læg.*, **113**, 199–203, Feb. 15, 1951. 9 refs.

2037. **Comparison of the Rat and Friedman Tests for Pregnancy.**

By R. V. HOFFMAN, R. L. MARKEY, and A. S. GIORDANO. *Amer. J. clin. Path.*, **21**, 33–37, Jan. 1951. 15 refs.

The opinion of the authors (from the South Bend Medical Foundation, Inc., South Bend, Indiana) is that in the diagnosis of pregnancy the rat ovary hyperaemic test is less sensitive than the Friedman test, and, therefore, less likely to be positive in conditions associated with a low titre of chorionic gonadotrophic hormone in the urine, as in very early pregnancy or in certain disturbances of pregnancy. If the titre is high, as at the menopause, the Friedman test may give a false positive result and the rat test a correct result.

In 50 cases in which 2 ml. of urine was injected subcutaneously into 2 rats, which were examined postmortem after 4 hours, the test was 88 per cent accurate, compared with the Friedman test on a single rabbit which was 90 per cent accurate. Preliminary injection of pituitary synergist decreased the accuracy of the rat test to 68 per cent. In 300 cases in which 4 ml. was injected and the necropsy made at 6 hours, the rat test was 83 per cent accurate and the Friedman test 91 per cent. It is stressed that these results indicate the relative accuracy of the 2 tests. *D. W. Higson*

2038. **Hyaluronidase and Friedman's Reaction.** (Jaluronidasi e reazione di Friedman.)

By C. PELLIZZANI. *G. Sci. med.*, **5**, 146–147, Aug. 1950. 8 refs.

2039. **The Estimation of Histidine in the Urine and its Significance in the Chemical Diagnosis of Pregnancy and as a Diagnostic Index in Toxaemia.** (Sul valore e sul significato dell'istidinuria come metodo di diagnosi chimica di gravidanza e come indice diagnostico nelle tossicosi.)

By M. PAGLIARI. *Arch. Sci. Med.*, **89**, 89–98, Jan. 1950. 31 refs.

The author has studied the behaviour of histidine in the urine of normal women, at various stages of the menstrual cycle, in normal pregnant women, in pregnant women affected by toxaemia, and in women affected by various gynaecological conditions. He has used the method of Cheval-Hans, modified by Kapeller-Alder and Carson-Saeks; this renders the reaction more precise and more certain.

The author has drawn the following conclusions: (1) In non-pregnant women, not only in the intermenstrual but in the pre-menstrual period, histidine is not detected in the urine. (2) In pregnant women, on the other hand, histidinuria occurs almost constantly, and in ever-increased amounts as pregnancy proceeds. (3) In cases of threatened abortion the reaction remains positive if the pregnancy continues, but in 4 cases it became negative when pregnancy was interrupted; in extra-uterine pregnancy histidinuria was present until rupture or tubal abortion. (4) Two women suffering from large fibroids passed histidine in the urine. (5) Of 3 cases of severe eclampsia, in 5 of serious albuminuria, and in 2 of severe jaundice the histidine disappeared from the urine in all but 3.

The author discusses these findings in the light of recent knowledge and advances theories to explain the complex enzymatic changes which can be verified in the blood serum of pregnant women and are the basis of these histidine effects.

Ian Aird

2040. **Diagnosis of Pregnancy with Histidine.** (Zur Frage der Schwangerschaftsdiagnose mittels Histidinbestimmung.)

By E. WALCH and I. v. KAPF. *Zbl. Gynäk.*, **73**, 1083–1089, 1951. 31 refs.

2041. **Sex Determination in Pregnancy.** (Diagnóstico del sexo en gestación.)

By C. A. VARGAS. *Obstet. Ginec. lat.-amer.*, **9**, 90–98, Mar.–Apr. 1951. 4 figs.

2042. **The Determination of Sex of the Foetus.** (Diagnóstico do sexo do feto.)

By N. DE CASTRO BARBOSA. *Rev. brasil. Med.*, **8**, 249–252, Apr. 1951.

2043. **Some Remarks on Auscultation of the Foetal Heart.** (Algunas consideraciones sobre la auscultacion cardiaca fetal entre nosotros.)

By L. LAVERDE MERCADO. *Rev. Obstet. Ginec.*, **10**, 261–270, 1950.

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2044. **Pseudocyesis.** (Graviditas spuria.)

By M. INGERSLEV. *Ugeskr. Læg.*, **113**, 855–857, June 28, 1951. 4 refs.

2045. **Simulated Pregnancy in a Male.**

By W. N. EVANS. *Psychoanal. Quart.*, **20**, 165–178, 1951. 9 refs.

2046. **Superfetation.**
By C. E. GAUPIN. *Amer. J. Obstet. Gynec.*, **62**, 212–213, July, 1951. 1 fig.

2047. **Hyperemesis Gravidarum.** (Hyperemesis gravidarum.)
By E. TONKES. *Geneesk. Gids*, **29**, 283–295, July 26, 1951. 41 refs.

2048. **Hypertensive Toxaemia of Pregnancy.** (Toxemia hipertensiva del embrazo.)
By N. QUIRNO. *Prensa méd. argent.*, **38**, 959–969, April 20, 1951.

2049. **Electrophoretic Studies of the Maternal Blood Serum in Toxaemia of Pregnancy.** (Elektrophoretische Untersuchungen des mütterlichen Blutserums bei Schwangerschaftsoxikosen.)
By V. FRIEDBERG. *Dtsch. med. Wschr.*, **76**, 798–800, June 15, 1951. 5 figs., 10 refs.

2050. **Electrophoretic Investigation of the Serum Albumin in Hyperemesis.** (Electrophoretische Serumeiweissuntersuchungen bei Hyperemesis.)
By H. E. LEVENS. *Med. Klinik.*, **46**, 443–445, Apr. 6, 1951. 3 figs., 17 refs.

2051. **Plasma Proteins in Toxemias of Pregnancy.**
By H. C. MACK *et al. J. clin. Invest.*, **30**, 609–615, June 1951. 25 refs.

2052. **Determination of Protein Reserve in Normal and Toxaemic Pregnancy.** (Die Bestimmung der Eiweissreserve bei normalen und toxischen Schwangeren.)
By H. KYANK. *Zbl. Gynäk.*, **73**, 1008–1011, 1951. 5 refs.

2053. **Minerals in the Etiology and Treatment of Eclamptic Toxemia.**
By S. S. GARRETT. *West. J. Surg. Obstet. Gynec.*, **59**, 366–370, July 1951. 30 refs.

2054. **Results of Cortisone Treatment in Dublin.**
By MEDICAL RESEARCH COUNCIL OF IRELAND. *Irish. J. med. Sci.*, 6th ser., **6**, 95–113, Mar. 1951.

In this preliminary report on the clinical investigation of cortisone by the Medical Research Council of Ireland, 8 cases of toxaemia of pregnancy are described. Clinical improvement occurred out of all proportion to the changes in the blood-pressure, albuminuria, and oedema. The oedema, however, frequently improved remarkably, while the effect on the blood-pressure and albuminuria varied, with a tendency to fall. It was the authors' opinion that the patients became less liable to develop fits.

In general it was considered that cortisone had its greatest use in diseases of limited duration such as rheumatic fever, toxaemia of pregnancy, ophthalmic diseases, and some allergic conditions. The effect of cortisone had been studied on 142 patients up to February 1951 (most of whom are not included in this preliminary report), included 88 eye cases, 29 cases of arthritis, 4 cases of rheumatic fever, and 8 cases of toxaemia of pregnancy. An account of the physiological background of cortisone is included in this article. *R. Hodgkinson*

2055. **Exchange Resins and Toxaemia of Pregnancy. A Preliminary Study.**
By L. D. ODELL, G. A. JANSSEN, J. C. NOVELLI, and D. G. RALSTON. *Amer. J. Obstet. Gynec.*, **62**, 121–128, July 1951. 5 figs., 10 refs.

2056. **The Aetiology and Pathogenesis of Eclampsia.** (Etiopatogenia de la eclampsia.)
By M. DÍAZ Y DÍAZ. *Med. latina*, **10**, 69–72, Jan.-Mar. 1951.

2057. **Eclampsia as the Result of a Circulatory Disturbance of Vegetative Nervous Origin.** (Die Eklampsie, die Folge einer vegetativ nervösen Kreislaufstörung.)
By H. KNAUS. *Med. Welt.*, **20**, 304–305, Mar. 10, 1951. 10 refs.

2058. **Is it possible to foretell the Development of Convulsions in Cases of Pre-eclampsia by Means of Electroencephalography?** (Gelingt es, mit Hilfe der Elektroenzephalographie den Ausbruch von eklamptischen Krämpfen bei Präeklampsie vorherzusagen?)
By C. SCHROEDER. *Med. Welt*, **20**, 306–309, Mar. 10, 1951. 9 figs., 7 refs.

2059. **High Fluid Intake in the Treatment of Eclampsia. A Report of 25 Cases.**
By F. E. WHITACRE and O. DELOZIER. *Sth. Med. J. Bgham, Ala*, 638–643, July 1951. 5 refs.

2060. **Eclampsia, Treatment with Veratrum Viride, Procaine, Magnesium Sulphate, and Dextrose.** (Eclampsia. Tratamiento con Veratrum Viride, Procaíne, Sulfato de Magnesio y Dextrosa.)
By G. ALFARO DE LA VEGA, M. L. JUAREZ and S. INCLAN. *Rev. Méd. Hosp. gen.*, **14**, 1–9, Jan. 1951. 2 figs., 29 refs.

2061. **Routine Examination of the Ocular Fundi as an Aid in Management of Toxaemias of Pregnancy.**
By D. M. GORDON. *J. Amer. med. Ass.*, **146**, 810–813, June 30, 1951. 1 fig., 11 refs.

2062. **The Frequency of Bleeding Simulating Menstruation during Pregnancy: Some Remarks Concerning its Origin.** (Ueber die Häufigkeit menstruationsähnlicher Blutungen in der Schwangerschaft nebst einigen Bemerkungen zu ihrer Genese.)
By H. GOECKE. *Dtsch. med. Wschr.*, **76**, 763–765, June 8, 1951. 8 refs.

2063. **The Abortion Rate. With a Note on the incidence of Sequential Abortion, and a Report of Eight Cases Treated with Progesterone.**
By H. A. RIPMAN. *Guy's Hosp. Rep.*, **100**, 121–128, 1951. 10 refs.

2064. **An Obstetrical Commentary on the Provisions of the Spanish Penal Code Concerning Abortion.** (Comentarios tocologicos al codigo penal en materia de aborto.)

By A. PEREIRA MARTINEZ. *Toko-ginec. pract.*, **10**, 93–105, Feb. 1951.

2065. **A Study of Threatened Abortion.** (Príspěvek ke studiu hrozících potratu.)

By E. SOYKOVÁ-PACHNEROVÁ and E. KRUTOVÁ. *Ceskoslov. Gynaek.*, **30**, 23–27, 1951. 8 refs.

2066. **The Precipitable Iodine of Serum in Normal Pregnancy and Its Relation to Abortions.**

By E. B. MAN, M. HEINEMANN, C. E. JOHNSON, D. C. LEARY, and J. P. PETERS. *J. clin. Invest.*, **30**, 137–150, Feb. 1951. 4 figs., 12 refs.

The serum content of protein-bound iodine (SPI), which is largely derived from thyroxine, is now known to be raised in pregnancy to levels which in the non-pregnant are characteristic of thyrotoxicosis. The authors have investigated the SPI of 46 normal pregnant women, of 12 pregnant women with various abnormalities, including 7 cases of toxaemia of pregnancy, and of 26 cases of abortion before the 16th week. In addition, 23 pregnant women were studied to whom thyroid had been administered.

The average level of SPI in non-pregnant individuals is, in the authors' experience, 5 μg. per 100 ml. of blood. In normal pregnancy the values were almost invariably more than 6 μg. per 100 ml. of blood. This rise is manifest by the sixth week of pregnancy, and the level remains raised until a week or so after delivery, although it is more labile than in the non-pregnant women. In pregnancy complicated by diabetes, toxaemia, disseminated sclerosis, and "vascular disease", there were no differences from the normal although one patient with toxaemia had a low SPI (4.8 μg. per 100 ml.).

In a series of cases of abortion, however, the value was less than 6 μg. per 100 ml. of blood in 18 of 26 cases. Thus an SPI which fails to rise in pregnancy, or rises and falls again, is often associated with abortion, although in about one-third of cases of abortion the SPI level is characteristic of normal pregnancy.

Six women who had previously suffered from abortion associated with low SPI level were studied in a later successful pregnancy in which 4 were receiving thyroid medication. Five out of the 6 had more than 6 μg SPI per 100 ml. of blood, the sixth having low values throughout. The SPI was determined in 10 cases of threatened abortion, all these patients having taken thyroid by mouth, while 3 had had intravenous thyroxine at some time during the pregnancy. In only 4 of these cases was the SPI level less than 6 μg. per 100 ml. All pregnancies continued to term, but the relatively small effect of oral thyroid on the SPI in these cases was noteworthy. Similarly 15 patients who received thyroid because of a history of infertility or repeated abortion never showed SPI values above those of normal pregnancy, indicating that pregnant women are somewhat resistant to exogenous thyroid.

Occasionally a patient was encountered in later pregnancy who was clinically normal, but had a low SPI level. No relationship could be found found between these low values and premature delivery. *A. Tichner*

2067. **The Therapeutic use of Sex Hormones in Obstetrics.** (L'utilizzazione terapeutica degli ormoni sessuali in ostetricia.)

By E. GUIDICI. *Ann. Ostet. Ginec.*, **73**, 323–386, Mar. 1951. 2 figs., bibliography.

2068. **The Guterman Reaction in the Prognosis of Abortion of Endocrine Origin.** (La réaction de Guterman et le prognostic de l'avortement endocrinien.)

By J. SÉGUY, M. ROBEY, and G. PIAUX. *Ginéc. et Obstét.*, **49**, 474–478, 1950. 15 refs.

The authors studied 17 cases of abortion divided into 2 groups: those in which there was a positive Guterman reaction and those in which the reaction was negative or doubtful. All were cases of threatened abortion during the first 14 weeks of pregnancy, and all were observed throughout the pregnancy.

In 8 out of the 9 cases in the first group the reaction was strongly positive; none of the patients was given progesterone, and all succeeded in going to term. In the ninth case the patient, who had a history of previous abortions, was given progesterone injections at the second month as a preventive measure. The injections were followed shortly by pain and haemorrhage, but the condition rapidly settled down with rest and sedatives.

Of the 8 patients in the second group, 4 had no progesterone therapy and abortion resulted in all. The other 4 patients received progesterone; 2 had a missed abortion and 2 went successfully to term.

Emphasis is laid upon the need for determining the presence or absence of luteal deficiency in all cases of threatened abortion, as the authors [in common with some other authorities] have found that while progesterone is fairly successful in cases in which there is luteal deficiency, it is harmful in those with normal luteal function. They suggest that the Guterman reaction provides a rapid and fairly reliable test of luteal function.

From their short series they draw the following conclusions. (1) Luteal insufficiency is responsible for only a small proportion of cases of abortion. (2) In cases where the Guterman reaction is positive progesterone therapy is contra-indicated and may be dangerous. (3) Where the Guterman reaction is negative, abortion is likely unless progesterone is given. They do not mention the dosage they use but consider that progesterone should be continued until 3 days after the arrest of the haemorrhage. The Guterman test should then be

repeated and, if positive, a subcutaneous pellet of 100 mg. progesterone is given. If the test is negative the ovum is, they consider, dead and further progesterone therapy valueless.

M. Halden Lloyd

2069. **Wheat Germ Oil Concentrate as an Aid in the Reduction of Pregnancy Complications.**

By W. M. SILBERNAGEL and J. B. PATTERSON. *Ohio St. med. J.*, **47**, 533–535, June 1951. 4 refs.

2070. **Blood Group Incompatibility in Abortion and Sterility.** [In English.]

By S. SJÖSTEDT, R. GRUBB, and F. LINELL. *Acta path. microbiol. scand.*, **28**, 375–387, 1951. 37 refs.

2071. **Habitual Abortion and the Rhesus Factor.** (Habitueller Abort und Rhesus-Faktor.)

By F. J. POTHMANN. *Wien. med. Wschr.*, **101**, 419–422, June 9, 1951. 26 refs.

2072. **The Technique of Legal and Illegal Abortion.** (Om tekniken ved legal og illegal svangerskabsafbrydelse.)

By J. FABRICUS-MOLLER and V. ORAM. *Ugeskr. Læg.*, **113**, 664–669, May 24, 1951. 2 figs., 15 refs.

2073. **Interruption of Pregnancy and Sterilization in Familial Erythroblastosis.** (Zur Frage der Schwangerschaftsunterbrechung und Sterilisation bei der familiären Erythroblastose.)

By P. DAHR. *Dtsch. med. Wschr.*, **76**, 513–516, Apr. 13, 1951. 2 figs., 4 refs.

2074. **A Fatal Attempt to Procure Abortion with "Movellan."** (Tödlicher Ausgang eines Fruchtabtreibungsversuches mit Movellan.)

By W. ADAM. *Münch. med. Wschr.*, **93**, 1063–1067, May 25, 1951. 13 refs.

2075. **Procuration of Abortion with a Match.** (Autoprovacazione di aborto mediante un fiammifero.)

By T. G. FORMAGGIO. *Minerva medicoleg.*, **71**, 62–68, May-June, 1951. 1 fig., 40 refs.

2076. **Interrupted Pregnancy as a Source of Danger.** (Die gestörte Schwangerschaft als Gefahrenquelle.)

By H. HEBERER. *Münch. med. Wschr.*, **93**, 819–826, Apr. 20, 1951. 1 fig.

2077. **A Study of Twenty-five Cases of Post-Abortal Hepatonephritis.** (Considérations à propos de 25 cas d'hépato-néphrite post-abortum.)

By R. MAHON, G. FAUGÈRE, and H. DAX. *Gynéc. et Obstét.*, **49**, 493–503, 1950. 3 refs.

The 25 cases of post-abortal hepato-nephritis analyzed by the authors occurred over a period of 10 years, and some of them, therefore, go back to the time before penicillin was available in France. Of the 25 patients 7 recovered, including 2 in whom hysterectomy had been performed. In this group pyrexia was constant, but variable in degree; a blood count showed in all cases a moderate anaemia and leucocytosis, and the blood culture (carried out in 3 cases) was negative. Jaundice was severe in 5 cases and slight in 2. Oliguria was present in all, but there was an improvement in this within 24 hours. The blood urea level varied from 68 to 310 mg. per 100 ml., but there was no correlation between the degree of nitrogen retention and the degree of oliguria; furthermore, a fall in the blood urea level was always noted within 24 hours of the start of treatment.

Of the 18 patients who died 5 were admitted to hospital moribund and are excluded from further consideration. Pyrexia varied from 101° and 104°F. (38° to 40°C.), but 3 patients admitted with established jaundice and uraemia were apyrexial. All patients showed a marked degree of anaemia and leucocytosis. Blood culture was carried out in 5 cases: in 2 it was negative, in 1 non-haemolytic streptococci were grown, and in 2 *Clostridium welchii*. The authors note that blood culture may be unreliable as a result of chemotherapy and they have now abandoned it in all but exceptional cases.

Jaundice was severe in 11 cases and mild in 2; it bore no relation to the degree of anaemia. Further, it was noted that as the jaundice faded the anaemia tended to increase. There was gross albuminuria in 5 cases, the urea level varied from 83 to 300 mg. per 100 ml. blood, and both these conditions grew steadily worse. It was observed that anuria was not necessarily associated with a high blood urea level.

Eight cases were treated without penicillin and in this group there were 7 deaths. Equivalent treatment was given in 12 cases, but with the addition of penicillin, and of these patients 6 recovered (one patient who recovered received streptomycin in addition). Apart from administration of antibiotics, treatment included pelvic surgery where necessary, decapsulation of the kidneys (6 cases), and infiltration of the renal pedicle. Medical treatment was also given on the lines usual for uraemia.

The authors advise examination under anaesthesia and gentle exploration of the uterus at an early stage, in order both to remove a potential source of toxins and to establish the extent of intrapelvic sepsis already present [a decision which they consider may be difficult to make in the conscious patient]. *M. Halden Lloyd*

2078. **Post-abortum Tetanus.** (Tétano pósabôrto.)

By I. NUSSENOVEIG, O. N. BOSSOI, O. STERSA, and A. MOSSA. *Rev. paulist. Med.*, **38**, 91–102, Feb. 1951. 29 refs.

2079. **Heart Disease in Pregnancy.** (Cardiopatías y embarazo.)

By J. M. MASCARÓ. *Arch. Enferm. Corázon*, **54**, 18–24, Jan.-Mar. 1951.

2080. **The Significance of Systolic Murmurs in Pregnancy.** (Valor del Soplo sistólico en las gestantes.)

By J. V. Coch and J. C. Bartolí. *Acta méd. hisp.*, **8**, 145–150, 3 figs., 21 refs.

2081. **Coarctation of the Aorta and Pregnancy.** (Sténose de l'isthme de l'aorte et grossesse.)

By P. Soulié, J. Di Mattéo, R. Tricot, and E. Éliachar. *Sem. Hôp. Paris*, 27, 593–599, Feb. 22, 1951. 29 refs.

The authors report 3 personal cases and review the literature on coarctation of the aorta in pregnancy. Two of the authors' patients had living children following vaginal delivery, although 1 patient required chemotherapy for intercurrent bacterial endocarditis. The third patient had her pregnancy terminated for cardiac failure at the third month. From their review of the literature the authors think that although the prognosis should be guarded, there is no need for undue pessimism, watchful expectancy should be adopted, and only exceptional circumstances justify termination of the pregnancy. Adequate rest is essential and supervision must be close as the situation may alter rapidly. The number of previous pregnancies should be taken into consideration, as should also be the facilities for rest.

Certain considerations apply particularly to coarctation. Age is important, most deaths occurring after 25. In the elderly woman the cerebral vascular changes are an additional danger. An important point is the fact that patients who had trouble in infancy and adolescence are the most likely to come to harm in pregnancy. No help can be gained from the blood-pressure or the difference that exists between the arms and legs. The development of the collateral circulation is of little value in prognosis, although it is suggested that impairment of the uterine blood supply may predispose to abortion. The presence of an aortic aneurysm is an absolute indication for termination of the pregnancy, and gross enlargement of the heart should also be regarded seriously, although enlargement of the left ventricle is usual in the condition. As yet there are too few reports on encephalograms to be of much help. It is possible that repair of the coarctation may offer great help in the future and a case is cited where a successful repair was undertaken in the third month.

[This is a good review of the subject, but little mention is made of the dangers of the frequently associated cerebral aneurysm. Patients should not be allowed to have a difficult vaginal delivery as the risks of cerebral haemorrhage and cardiac failure are very real.] *D. C. A. Bevis*

2082. **Splenectomy and Cesarean Section in Pregnancy Complicated by Acute Thrombocytopenic Purpura. Clinical Evidence for Hormone Control of Thrombocyte Level.**

By D. P. Slaughter, H. W. Southwick, F. H. Falls, and L. R. Limarzi. *Arch. Surg.*, **63**, 132–138, July 1951.

2083. **Experience with "Thrombocid" in Pregnancy, Labour, and Lactation.** (Erfahrungen mit "Thrombocid" in der Schwangerschaft, unter der Geburt und in der Laktationsperiode.)

By A. Esser and O. Scholl. *Med. Welt*, **20**, 319–321, Mar. 10, 1951. 2 figs., 11 refs.

2084. **Researches on Heparin in Pregnancy at Term and in the Puerperal State.** (Ricerche sull' eparina in gravidanza a termine e nello stato puerperale.)

By L. Mezzana and G. Comanedi. *Minerva ginec.*, **3**, 113–116, Mar. 1951. 45 refs.

2085. **Intravenous Iron Therapy in the Nutritional Anaemia of Pregnancy.** (O ferro venoso no tratamento da anemia carencial da gravidez.)

By L. R. L. De Gouvea, H. De Castro Lobo, and P. Morand. *Arch. brasil. Med.*, **40**, 259–265, July-Aug. 1951. 3 figs.

2086. **Intravenous Treatment of Iron Deficiency Anaemia with "Ferrophor."** (Ueber intravenöse Behandlung von Eisenmangelanämien mit Ferrisaccharat in der Gynäkologie.)

By A. Strahm and F. Walter. *Zbl. Gynäk.*, **73**, 1011–1015, 1951. 2 figs., 5 refs.

2087. **A Study of the Significance of Rh Antibody Titration during Pregnancy.**

By B. J. Arnold, R. J. Walsh, and R. Herzger. *Med. J. Aust.*, **1**, 301–303, Feb. 24, 1951. 1 ref.

In an attempt to reduce errors in the estimation of maternal Rh agglutinins the authors have evolved a system of parallel titration. A sample of serum containing Rh agglutinins is taken early in pregnancy and frozen at −12°C. It is assumed that no deterioration takes place in the serum for about 6 months. This serum is thawed when a further sample is obtained later in pregnancy, and both specimens (in one instance 5 specimens) are titrated against the same suspension of test cells with the same diluents.

In all cases titrations are performed in protein media. The serum is diluted with fresh pooled homologous serum and the cells suspended in 30 per cent albumin solution. The mixtures are incubated at 37°C. for 60 minutes, then lightly centrifuged before being transferred by pipette to slides and examined with a low-powered microscope lens. Suspensions of cells of several known genotypes are used so that anti-C and anti-E can be identified in addition to anti-D. Where serum contains complete antibodies it is diluted with saline and tested against a saline suspension of erythrocytes.

The following were the results obtained in 36 patients tested: (1) a rising titre occurred in 11

subjects, who gave birth to 10 Rh-positive and 1 Rh-negative babies; (2) a falling titre occurred in 2 subjects; they produced Rh-negative babies who were severly affected and died shortly after birth; (3) an unchanged titre in 23 subjects, who gave birth to 17 Rh-positive and 6 Rh-negative babies.

A hypothesis to explain variation in titre is put forward, namely, that where there is a rise in titre during pregnancy the maternal production of agglutinins exceeds foetal absorption and where there is a fall in titre the reverse takes place. The workers are of an opinion that titration is of no value in determining the severity of disease in the foetus if agglutinins are present during the current pregnancy, and furthermore, as is shown by their investigations, it is impossible to predict an Rh-negative child with any certainty if agglutinins are present at the first examination.

Jean R. C. Burton Brown

2088. **Studies in Rh Sensitization. I. Methods. II. Effect of Rh-negative Pregnancies on Rh Antibody Titer.**

By A. S. WIENER, R. NAPPI, and E. B. GORDON. *Blood*, **6**, 522–531, June 1951. 16 refs.

2089. **The Question of Rh-hapten Prophylaxis.** (Zur Frage der Rh-Haptenprophylaxe.)

By R. HOLLANDER. *Med. Klinik*, **46**, 441–443, Apr. 6, 1951. 1 fig., 5 refs.

2090. **Concerning Pregnancy After Ureterointestinal Anastomosis.**

By F. HINMAN. *Amer. J. Obstet. Gynec.*, **62**, 192–194, July 1951. 2 figs., 9 refs.

2091. **Appendicitis in Pregnancy.** (Apendicitis y Embarazo.)

By F. PEREZ ACOSTA. *Rev. méd.-quirurg. Oriente*, **10**, 197–201, Dec. 1950. 4 figs., 2 refs.

2092. **Acute Appendicitis in the Obstetric Patient.**

By H. D. PRIDDLE and H. C. HESSELTINE. *Amer. J. Obstet. Ginec.*, **62**, 150–155, July 1951. 5 refs.

2093. **Diabetes and Pregnancy: with Special Reference to the Prediabetic State.**

By J. M. MOSS and H. B. MULHOLLAND. *Ann. intern. Med.*, **34**, 678–691, Mar. 1951. 3 figs., bibliography.

From among a series of 500 diabetic women seen over a period of 20 years, records of 450 pregnancies, occurring in 72 of them either in the diabetic or pre-diabetic state, were available: these records form the basis of the study reported. The statistics found are in general agreement with those of most other writers on the subject; thus in the diabetic group the over-all foetal mortality-rate rate was 54·7 per cent and bore little relation to the severity of the maternal diabetes; the usual high incidence of large babies (weight exceeding 10 lb. (4·5 kg.)), late pregnancy toxaemia, stillbirths, neonatal deaths, and spontaneous abortions was found; the occurrence of these complications in the 30 years preceding the onset of clinical diabetes, but particularly in the last 5 of those years, was once again observed and gave added confirmation to the existence of the " pre-diabetic state ".

The authors discuss the relation of so-called benign renal glycosuria in pregnancy to latent or mild diabetes and point out the difficulties of making the correct diagnosis. Since the outcome of the pregnancy may depend to some extent upon this, they feel that a postprandial urine specimen should be tested for reducing substances at each antepartum visit, while all patients with glycosuria, obesity, and a family history of diabetes, or who have previously had any of the complications of pregnancy common to diabetics and pre-diabetics, should have a glucose tolerance test. They state that if the fasting blood sugar level exceeds 120 mg. per 100 ml. of blood or the level at one hour exceeds 180 mg. per 100 ml., or that at 3 hours is still above 120 mg. per 100 ml., the patient should be classed and treated as a diabetic. They treated a series of 6 pregnant diabetics with stilboestrol and progesterone as advocated by White (*Treatment of Diabetes Mellitus*, 8th edit., 1947, Philadelphia) without any foetal death; none of the babies was large and no mother required Caesarean section. They admit that no conclusion can be drawn from so small a series, but point out that in these patients' 26 previous pregnancies the foetal mortality rate was 27 per cent and that only 38·5 per cent of these pregnancies were entirely normal.

G. I. M. Swyer

2094. **Treatment of a Case of Diabetes and Pregnancy by Implantation of " Progynon " and " Proluton C " Crystals.** (Behandlung eines Falles von Schwangerschaft bei schwerem Diabetes durch Implantation von Progynon und Proluton-C-Kristallen.)

By H. BALTZER and K. DUERBECK. *Zbl. Gynäk.*, **73**, 767-771, 1951. 17 refs.

2095. **The Precipitable Iodine of Serum in Pregnancy Complicated by Disorders of the Thyroid**

By W. W. ENGSTROM, D. M. KYDD, J. P. PETERS, and E. B. MAN. *J. clin. Invest.*, **30**, 151–160, Feb. 1951. 8 figs., 6 refs.

The serum protein-bound iodine (SPI) content in pregnancy is raised to levels which, in the non-pregnant state, would betoken hyperthyroidism. The authors report the effects of pregnancy on the SPI level of 16 patients with thyroid disease (10 hyperthyroid, 2 hypothyroid, 3 possibly hypothyroid, and 1 questionable hyperthyroid). In all cases the patients were under medical treatment for their condition so that the results obtained are variable and their interpretation difficult. Some generalizations can, however, be made. On the whole, the hyperthyroid patients showed a rise in SPI level above the non-pregnant value and above the value in euthyroid pregnant patients. This rise

was not accompanied by an exacerbation of the disease but rather by a decrease in severity, the disease becoming more easily controlled during pregnancy.

In hypothyroidism, although the figures hardly justify any conclusions being drawn, it appears that the SPI level rises in pregnancy and exceeds the patient's non-pregnant value, but does not reach normal pregnant levels. In a euthyroid individual a low SPI level often precedes abortion, but the low values found in these hypothyroid cases indicate that a low SPI level is not inconsistent with a normal pregnancy. *A. Tichner*

2096. **Lymphogranulomatosis and Pregnancy.** (Lymphogranulomatose und Schwangerschaft.)
By W. T. STOECKEL. *Zbl. Gynäk.*, **73**, 1173–1181, 1951. 6 figs., 16 refs.

2097. **The Use of Testosterone Propionate in Nephropathies of Pregnancy.** (L'uso del propionato di testosterone nelle nefropatie gravidiche.)
By U. CIULLA. *Ann. Ostet. Ginec.*, **73**, 97–104, Jan. 1951. 22 refs.

2098. **Glomerulonephritis in Pregnancy.**
By E. MUSSEY. *Med. Clin. N. Amer.*, **35**, 1051–1068, July 1951. 36 refs.

2099. **Anuria in Obstetric Practice.**
By R. C. GILL. *Med. J. Aust.*, **2**, 45–47, July 14, 1951. 11 refs.

2100. **Hyperplastic Corpus Luteum of Pregnancy, Associated with Carcinoma of the Breast.**
By J. B. AARON, J. S. BEILLY, and N. MITCHELL. *Amer. J. Obstet. Gynec.*, **62**, 199–202, July 1951. 4 figs., 5 refs.

2101. **The Surgical Treatment of Tumours and Secondary Infectious Conditions of the Genital Tract During Pregnancy.** (Cirugia de los tumores y secuelas infecciosas del aparato genitaldurante el embarazo.)
By O. AGUERO. *Rev. Obstet. Gynec.*, **10**, 271–277, 1950. 16 refs.

2102. **Successful Radiotherapy of Vaginal Carcinoma in a Pregnant Woman.** (Erfolgreiche Strahlenbehandlung eines Scheidenkarzinoms bei einer Schwangeren.)
By J. RIES. *Zbl. Gynäk.*, **73**, 1155–1162, 1951. 2 figs., 8 refs.

2103. **Removal of Ruptured Endometrial Cyst During Pregnancy.**
By K. N. CAMPBELL and J. M. ALLEN. *Alex. Blain Hosp. Bull.*, **10**, 44–51, May 1951. 4 figs., 8 refs.

2104. **Gigantomastia During Pregnancy.** [In English.]
By H. E. BOEKE. *Arch. chir. neerl.*, **3**, 76–79, 1951. 1 fig., 6 refs.

2105. **The Effect of Pregnancy on Otosclerosis.**
By E. PEARSON. *Ann. west. Med. Surg.*, **5**, 477–482, May 1951. 4 figs., 8 refs.

2106. **Diseases of the Nervous System in Pregnancy.** (Enfermedades del sistema nervioso y embarazo.)
By R. DEL VALLEY Y ADARO. *Toko-ginec. pract.*, **10**, 77–92, Feb. 1951. 26 refs.

2107. **Pregnancy, Parturition, and Lactation, after Destruction of the Pituitary Gland by an Intracranial Neoplasm.** (Gravidanza, parto ed allattamento ad ipofisi distrutta da neoplasia endocranica.)
By A. DELLA BEFFA. *Folia endocrinol., Pisa*, **4**, 119–132, Feb. 1951. 1 fig., 20 refs.

2108. **Infectious and Parasitic Diseases in Pregnancy.** (Enfermedades infecciosas y parasitarias y embarazo.)
By R. DEL VALLE Y ADARO. *Toko-ginec. pract.*, **10**, 259–271, May 1951. 23 refs.

2109. **Tuberculosis in Pregnancy, Labor and Puerperium.**
By J. M. REESE and C. W. MARTIN. *Sth. med. J.*, **44**, 523–527, June 1951. 6 refs.

2110. **Streptomycin Therapy for Tuberculosis in Pregnancy.** (Zur Frage der Streptomycin-therapie bei der Schwangerschaftstuberkulose.)
By W. FAASS. *Med. Klinik*, **46**, 445–447, Apr. 6, 1951. 18 refs.

211. **Sarcoidosis. V. The Effects of Pregnancy on the Course of the Disease.**
By S. W. DONALDSON, A. C. TOMPSETT, R. H. GREKIN, and A. C. CURTIS. *Ann. intern. Med.*, **34**, 1213–1218, May 1951. 3 figs., 7 refs.

2112. **Rubella in Pregnancy.** (Röteln in der Schwangerschaft.)
By F. E. GUNTHER. *Med. Welt*, **20**, 603–604, May 5, 1951. 5 refs.

2113. **Bacilluria during Pregnancy and Puerperium.** (Ueber das Vorkommen von Keimen im Schwangeren- und Wöchnerinnenurin.)
By E. ENDERLE and T. DIMMLING. *Zbl. Gynäk.*, **73**, 1092–1098, 1951. 30 refs.

2114. **Damage to the Central Nervous System due to the Arsenical Treatment of Syphilis during Pregnancy.** (Ueber die Gefahren der Luesbehandlung in der Schwangerschaft, ein klinischer und pathologisch-anatomischer Beitrag zur Frage der Salvarsanschäden des Zentralnervensystems.)
By K. STUERMER and G. PETERS. *Dtsch. med. Wschr.*, **76**, 548–550, Apr. 20, 1951. 25 refs.

2115. **Syphilitic Infection of the Mother in Relation to the Fate of the Products of Conception.** (Infezione luetica della madre e destino del prodotto del concepimento.)
By L. D'INCERTI BONINI and I. VANDELLI. *Ann. Ostet. Gynec.*, **73**, 105–141, Jan. 1951. Bibliography.

2116. **The Incidence of Toxoplasmosis Among Pregnant Women in Iowa.**
By V. M. STUERMER, R. J. STEIN, and J. H. RANDALL. *J. Iowa med. Soc.*, **41**, 248–252, July, 1951. 39 refs.

2117. **The Treatment of Helminthosis in Pregnancy.** (Tratamento das helmintoses na gestaçao.)
By A. S. GUTMAN. *Rev. Ginec. Obstet.*, **45**, 29–40, Jan. 1951. 18 refs.

2118. **Evaluation of Treatment for Monilia in Pregnancy.**
By H. I. KANTOR. *Amer. J. Obstet. Gynec.*, **62**, 170–172, July 1951. 4 refs.

2119. **A Case of Pregnancy at Term in a Rudimentary Horn.** (Um caso de gravidez a têrmo em corno uterino rudimentar.)
By T. DIAS and A. A. JUNIOR. *Rev. pernambuc. Matern. Inf.*, **3**, 221–230, Dec. 1950. 6 figs., 14 refs.

2120. **The Diagnosis and Treatment of Extrauterine Pregnancy.** (Zur Diagnose und Therapie der Extrauteringravidität.)
By W. LEHMANN. *Med. Klinik*, **46**, 612–616, May 25, 1951. 2 figs., 15 refs.

2121. **Recurrent Ectopic Gestation.** (La gestacion ectópica reincidente.)
By D. R. GARCIA PASTOR. *Toko-ginec. pract.*, **10**, 147–168, Mar. 1951. 3 figs., 7 refs.

LABOUR

2122. **The Psychological Aspects of Childbirth.**
By W. I. C. MORRIS. *Clin. J.*, **80**, 173–175, July 1951.

2123. **Cytological Examination of Urinary Sediment immediately Ante Partum.** (Ueber zytologische Urinsedimentuntersuchungen kurz ante partum.)
By G. L. WIED. *Zbl. Gynäk.*, **73**, 1075–1083, 1951. 12 figs., 8 refs.

2124. **Comparative Electrophoretic Studies of the Serum Albumin in Retroplacental and Umbilical Venous Blood at the Time of Birth.** (Vergleichende Elektrophoretische Untersuchungen über das Serumeiweissbild im retroplacentar- und Nabelvenenblut unmittelbar nach der Geburt.)
By H. BLEEK and F. HARTMANN. *Klin. Wschr.*, **29**, 257–260, Apr. 1, 1951.

2125. **Urinary Excretion of Oestrogens and 17-Ketosteroids Before, During, and After Labour.** (Excreção urinaria de estrógenos e 17-cetosterois, antes, durante e após o trabalho de parto.)
By C. WEHRS. *Rev. Gynec. Obstet.*, **45**, 133–148, Mar. 1951. 5 figs., 32 refs.

2126. **The Problem of Passage of Erythrocytes through the Placenta during Labour. Studies with Radioactive Erythrocytes.** (Zur Frage des Plazentaren Erythrocytenübertritts unter der Geburt. Untersuchung mit radioaktivmarkierten Erythrocyten.)
By H. MITTELSTRASS and W. HORST. *Klin. Wschr.*, **29**, 412–413, June 15, 1951. 2 figs., 7 refs.

2127. **Observations on Labour in Primiparae after Successful Resection of the Presacral Nerve for Dysmenorrhoea.** (Etude de l'accouchement chez les primipares opérés avec succès de résection du nerf présacre pour dysmènorrhée.)
By M. DUMONT. *Gynéc. et Obstét.*, **50**, 35–41, 1951. 17 refs.

After summarizing the observations of others on labour following presacral neurectomy, and his own previously published conclusions, the author discusses 38 further cases. All were in primiparae and in every case the operation had been a success. All but 7 patients were under 30, and 25 had conceived within 2 years of the operation. There were 5 forceps deliveries, 1 breech extraction, 1 Caesarean, and the remainder spontaneous. The period of dilatation was in general shortened, in 81 per cent lasting less than 11 hours. The whole labour took less than 12 hours in 73 per cent of cases. In 16 per cent dilatation was painless and in 60 per cent slightly painful. The duration and pain of the second stage were unaffected. Analgesia was given in 36 per cent of cases; in 58 per cent the memory of labour was pleasant. It is concluded that in 76 per cent of labours following successful presacral neurectomy, relief of pain in the first stage may be expected.

Margaret Puxon

2128. **Natural Delivery by Traction of the Cord.** (Delivaramento natural for tração funicular.)
By D. VINHAES. *Hospital, Rio de J.*, **39**, 75–370, Mar. 1951.

2129. **The Significance of Variations in the Time of Rupture of the Membranes during Labour.** (Die Bedeutung der zeitlichen Variationen des Fruchtblasensprunges sub partu.)
By K. ABT. *Gynaecologia, Basel*, **132**, 65–91, Aug. 1951. 2 figs., bibliography.

2130. **Premature Separation of the Normally Implanted Placenta. A Clinical Review of 340 Cases. Sloane Hospital for Women, 1933—1949.**
By S. M. BYSSHE. *Amer. J. Obstet. Gynec.*, **62**, 38–51, July 1951. 24 refs.

2131. **Prolapse of the Cord During Labor.**
By A. N. FENTON and D. A. D'ESOPO. *Amer. J. Obstet. Gynec.*, **62**, 52–64, July 1951. 6 figs., 9 refs.

2132. **Amniotomy for the Elective Induction of Labor At or Near Term. Presentation and Analysis of Six Hundred and Fifty-three Cases.**
By B. J. HANLEY. *West. J. Surg. Obstet. Gynec.*, **59**, 262–274, June 1951. 9 figs., 13 refs.

2133. **Intravenous Use of Dilute Posterior Pituitary Extract During Labour.**
By C. A. GORDON. *Amer. J. Surg.*, **82**, 76–80, July 1951. 12 refs.

2134. **The Oxytocic Action of Sparteine Sulphate in Uterine Inertia.** (Acción occitócica del sulfato de esparteina inercia uterina.)

By J. SENTIS ANFRUNS. *Toko-ginec. pract.*, **10**, 143–146, Mar. 1951.

2135. **Effect of Thoracolumbar Sympathectomy on Labor.**

By L. M. HERSHENSON. *Amer. J. Obstet. Gynec.*, **62**, 206–208, July 1951. 5 refs.

2136. **An Analysis of 445 Cases of Internal Podalic Version.**

By J. C. JARRETT and K. R. BRANDEBERRY. *Surg. Gynec. Obstet.*, **93**, 109–111, July 1951. 9 refs.

2137. **Face Presentation During Labor: Case Report.**

By G. H. WARD. *Ann. west. Med. Surg.*, **5**, 552–553, June 1951. 3 figs., 3 refs.

2138. **Two Cases of Knee Presentation.** (La presentacion de rodilla.)

By D. E. CARAVIAS VERA and D. A. LEDESMA. *Sem. méd., B. Aires*, **58**, 452–456, Mar. 29, 1951. 47 refs.

2139. **The Risk to Mother and Child in Breech Delivery.** (El riesgo materno fetal en el parto pelvico.)

By L. CASTELAZO AYALA. *Ginec. Obstet. Méx.*, **6**, 65–84, Jan.-Feb. 1951. Bibliography.

2140. **Rupture of the Uterus Associated with Spontaneous Labour and Delivery.**

By W. F. DILLON and H. E. SCHMITZ. *Amer. J. Obstet. Gynec.*, **62**, 218, July 1951.

2141. **Complications of the Third Stage of Labor.**

By R. E. CAMPBELL. *Postgrad. Med.*, **9**, 477–481, June 1951. 1 fig.

2142. **Subcutaneous Emphysema in Labour.** (Subkutant emfysem ved partus.)

By B. LANDAAS. *Nord. Med.*, **45**, 199, Feb. 7, 1951. 1 fig., 8 refs.

2143. **Post-partum Eclampsia.**

By W. S. CAMPBELL. *Ulster med. J.*, **20**, 66–74, May, 1951. 17 refs.

2144. **Postpartum Necrosis of the Adenohypophysis with Hypoglycemic Convulsions.**

By E. C. CLARK, M. FRANKLIN, and A. L. SAHS. *Arch. Neurol. Psychiat.*, **65**, 724–731, June 1951. 2 figs., 11 refs.

ANAESTHESIA

2145. **Prophylactic Psychological Preparation, for Painless Childbirth.** (Psychoprofylaktická príprava k bezbolestnému porodu.)

By J. LUKÁS. *Ceskoslov. Gynaek.*, **16**, 158–165, 1951.

2146. **Analgesia in Normal Obstetrics.** (L'analgésie en obstétrique normale.)

By J. BARNES. *Brux.-méd.*, **31**, 1097–1108, May 27, 1951. 3 figs., 13 refs.

2147. **The Influence of Certain Anaesthetics, Analgesics and Hypnotics on the Child.** (Der Einfluss der einzelnen Anästhetica, Analgetica und Hypnotica auf das Kind.)

By F. E. KÖNIG. *Gynaecologia, Basel*, **131**, 298–316, May 1951. Bibliography.

2148. **The Advantages to Mother and Infant of Amphetamine in Obstetrical Analgesia.**

By S. ABEL, Z. B. BALL, and S. C. HARRIS. *Amer. J. Obstet. Gynec.*, **62**, 15–27, July 1951. 2 figs., 22 refs.

2149. **"Heptalgin" as an Obstetric Analgesic.**

By M. HILL. *Med. J. Aust.*, **1**, 212–214, Feb. 10, 1951. 2 refs.

The author reports results of clinical trials with "heptalgin", known as "C.B. 11", which has been claimed to have six times the analgesic potency of morphine, twenty times that of pethidine, and at least three times that of "amidone".

The drug was tried on 50 patients. Of these, 40 were given heptalgin alone during labour, while 4 control groups, each of 40 similar patients, were given respectively; (*a*) pethidine, 100 mg. intramuscularly; (*b*) pethidine, 50 mg., and hyoscine 1/300th gr. (0.22 mg.) intramuscularly; (*c*) potassium bromide, 30 gr. (2.0 g.), and chloral hydrate, 20 gr. (1.3 g.); (*d*) no analgesic. In all cases of the series heptalgin, 10 mg. was given at 3 fingers' dilation of the cervix, and delivery was conducted under an ether-air mixture, using a Small's machine.

The duration of the effective dose was never more than 1 hour 10 minutes. The only side-effects were transient dizziness and vomiting, and there was no disturbance in the babies which could be attributed to the drug. Of the 40 patients, 20 considered they had good relief from the drug, and most of the other patients had a very nervous temperament. Failure to relieve the pain in some multigravidae was thought to be due to a rapid labour advancing too forcibly when the drug was given, which suggests that in such cases the drug may be given earlier with advantage. In the author's opinion heptalgin hastens dilation of the cervix, this may also account for the failure to relieve the pain in some of the multigravidae. This opinion is supported by a chart showing the hours in labour of patients in the five series. In 2 patients heptalgin was safely repeated in a 50-mg. dose during long labours.

In the other 10 patients of the group heptalgin was given during a long labour in which other drugs had been used. The opinion of 8 patients was that heptalgin was superior to the other drugs (pethidine, hyoscine, bromide, and chloral).

The author concludes from the trial that heptalgin is at least as good as pethidine, or pethidine with hyoscine, and better than bromide and chloral. *Marie H. Calverley*

2150. **Analgesia and Anaesthesia in Childbirth.** (Die geburtshilfliche Analgesie und Anästhesie.)
By O. KASER, F. E. KOENIG, and M. ETTERICH. *Gynaecologia, Basel*, **131**, 257–298, May 1951. Bibliography.

2151. **Experience with Trichlorethylene as an Obstetrical Analgesic.** (Erfahrungen mit der Anwendung von Trichloräthylen zur Schmerzlinderung unter der Geburt.)
By H. HOSEMANN and T. HICKL. *Dtsch. med. Wschr.*, **76**, 725–727, June 1, 1951. 34 refs.

2152. **Analgesia with Trichlorethylene in Labour: 210 Cases.** (Considerazioni su 210 casi di analgesia nel parto col trichloroetilene.)
By P. ALFIERI. *Minerva ginec.*, **3**, 161–165, Apr. 1951. 2 figs., 6 refs.

2153. **Further Experience with Nitrous Oxide as an Analgesic in Childbirth with Particular Reference to the Second Stage.** (Weitere Erfahrungen mit Lachgas zur Schmerzlinderung unter der Geburt mit besonderer Berücksichtigung der Austreibungsperiode.)
By J. PLOTZ. *Med. Welt*, **20**, 321–323, Mar. 10, 1951.

2154. **Local Analgesia in Obstetrics.** (Les anesthésies de conduction en obstétrique.)
By F. DE SENARCLENS, M. DE SENARCLENS, P. KOENIG, and H. MULLER. *Gynaecologia, Basel*, **131**, 316–359, May 1951. Bibliography.

2155. **Local and Regional Analgesia in Obstetrics.** (Anestesia loco-regional em obstetricia.)
By L. A. CORRÉA DA COSTA. *An. brasil. Ginec.*, **16**, 1–14, Jan. 1951.

2156. **The Effect of Ephedrine Upon Uterine Motility during Labour under Spinal Anesthesia. A Preliminary Report.**
By G. J. ANDROS and R. L. MILLER. *Univ. Mich. med. Bull.*, **17**, 10–17, Jan. 1951. 2 figs., 11 refs.
The authors describe the effect of parenteral injections of adrenaline upon uterine contractions in the first stage of labour, with special reference to patients who have been given low spinal analgesia. The patients included 7 multiparae and 5 primiparae, 2 being anaesthetized and regarded as controls. The principal effect of parenteral adrenaline was noted after intravenous injection of 25 mg. and consisted of incomplete relaxation of the uterus beginning about 10 seconds after the peak of the first contraction so affected, and persisting through a variable number of contractions in diminishing fashion. Intramuscular injections of adrenaline in twice the intravenous dose produced no consistent effect upon contractions. There appeared to be "foetal excitement" after intravenous injection of adrenaline, as evidenced by increased foetal movements and tachycardia. The authors consider that there is no foundation for the idea that adrenaline used to correct hypotension in spinal analgesia adds to existing depression of uterine tone and to the risk of postpartum haemorrhage. *L. A. Cruttenden*

2157. **Spinal Analgesia in Clinical Obstetrics.** (Raquianestesia em clinica obstétrica.)
By B. NEME and J. ONOFRE ARAUJO. *Arch. Cirurg. clín. exp.*, **14**, 13–22, Jan.-Feb. 1951.

2158. **Saddle-Block Analgesia in Childbirth.** (Die Schmerzbekämpfung unter der Geburt durch lumbale Grenzstrangblockade.)
By J. ERBSLÖH and J. BRANDT. *Med. Welt*, **20**, 315–319, Mar. 10, 1951. 3 figs., 16 refs.

2159. **Personal Experience of Thoracolumbar Sympathetic Block in Gynaecology and and Obstetrics.** (Il nostro contributo e la nostra esperienza sull'anestesia del simpatico toraco-lombare nel campo ostetrico e ginecologico.)
By G. GARRONE. *G. ital. Anest.*, **17**, 52–58, Jan.-Mar. 1951. 10 refs.

2160. **Anaesthesia and Curare in Obstetrics.** (Anestesiologia y curare en obstetricia.)
By P. A. SEGARRA TRUTIÉ. *Med. latina*, **10**, 33–40, Jan.-Mar., 1951.

2161. **The Action of D-Tubocurarine and Certain Synthetic Curarizants on the Isolated Guinea-pig Uterus and its Clinical Application in Labour.** (Azione della d-tubocurarina e di alcuni curari di sintesi sull' utero isolato di cavia ed applicazioni cliniche in travaglio di parto.)
By B. MAGGIPINTO. *G. Ital. Anest.*, **17**, 64–66. Jan.-Mar., 1951.

2162. **The Use of Muscle-Relaxing Drugs in Complicated Deliveries.**
By B. R. AUSTIN and T. W. MERING. *Amer. J. Obstet. Gynec.*, **62**, 143–149, July 1951. 6 refs.

PUERPERIUM

2163. **Lochia. A Quantitative Study.**
By J. B. BERNSTINE and R. L. BERNSTINE. *West. J. Surg. Obstet. Gynec.*, **59**, 312–314, June 1951. 2 figs.

2164. **Epithelial Changes in the Puerperal Fallopian Tube.**
By M. C. ANDREWS. *Amer. J. Obstet. Gynec.*, **62**, 28–37, July 1951. 8 figs., 7 refs.

2165. **Shortcomings in Puerperal Care.**
By N. F. MILLER. *J. Iowa med. Soc.*, **41**, 245–247, July 1951.

2166. **A Pathogenetic Study of Megaloblastic Puerperal Anaemia Responsive to Folic Acid.** (Considerazioni patogenetiche sulle anemie megaloblastiche puerperali folico-sensibili.)

By P. LEONARDI. *Rif. med.*, **65**, 513–519, May 12, 1951. 7 refs.

2167. **Genital Haemorrhage in the Puerperium.** (Hemorragias genitales del puerperio.)

By A. STÁBILE. *Clin. y Lab.*, **51**, 338–349, May 1951.

2168. **Instrumental Treatment of Puerperal Haemorrhage.** (Ancora a proposito della terapia strumentale delle emorragie puerperali.)

By M. NIZZA and A. MASSANO. *Minerva ginec.*, **2**, 532–537, Dec. 1950. 44 refs.

2169. **A Case of Spontaneous Sub-arachnoid Haemorrhage in the Puerperium.** (Sulla emorragia sotto-aracnoidea spontanea nello stato puerperale.)

By T. SUTTORA. *Minerva ginec.*, **2**, 552–556, Dec. 1950. 12 refs.

2170. **The Effect of Routine Administration of Dicoumarol to Patients with a Subfebrile Temperature on the Sixth Day of the Puerperium.** (Action d'une dose standard de dicoumarol chez les accouchées présentant une température sub-fébrile au sixième jour des suites de couches.)

By H. PIGEAUD and E. ZAHEDI. *Pr. méd.*, **58**, 1413, Dec. 23, 1950. 1 fig.

Since it has proved possible to control blood coagulation with safety by the use of anticoagulants, the authors tried the effect of dicoumarol in resolving minor pyrexias in the puerperium in cases without clinical manifestations such as frank phlebitis or urinary or breast infections. The results in 61 cases are given. The treatment was limited to patients with a temperature below 37.6°C. (100°F.) and in whom this temperature had been sustained from the third day of the puerperium onwards. Therapy was instituted as a routine on the sixth day, dicoumarol being given by injection in doses of 250 mg. the first, 150 mg. the second, and 100 mg. the third day. The prothrombin level was estimated daily. In no case was any untoward effect observed, nor did the prothrombin level fall below 30 per cent.

Clinically, 35 cases responded quickly and 26 more slowly, but even then pyrexia took only a few days to settle. For comparison, a control series of similar cases, seen in 1946 to 1947, was analyzed. The incidence of rapid resolution was only 6 per cent compared with 57 per cent in the dicoumarol series. The authors stress the importance of adhering strictly to the correct dosage.

Kenneth Bowes

2171 **The Treatment of Generalized Staphylococcal Infections.**

By A. M. RAMSAY and J. VAHRMAN. *Lancet*, **1**, 425–428, Feb. 24, 1951. 4 figs., 7 refs.

Generalized staphylococcal infections in a puerperal sepsis unit have been divided into 3 groups, occurring in: (1) the pre-penicillin era; (2) the early penicillin era; and (3) late penicillin era. Between January 1937, and December 1943, 23 cases showed little response to sulphonamides and staphylococcal antitoxin, and the mortality was 43.4 per cent. Between December 1943, and April 1946, 8 cases were treated with a low dosage of penicillin (about 15,000 units 3- to 4-hourly). Two cases were fatal, and only 2 responded well to this dosage of penicillin. A third group, treated since April 1946, consisted of 5 cases, and a massive dosage of 500,000 units 3-hourly was used from the time of diagnosis. This gave satisfactory results, with no deaths and rapid improvement in the patients' condition. Two further cases were, however, fatal in spite of massive dosage, so it is suggested that it may be necessary to have recourse to aureomycin if obvious clinical benefit does not result within 48 hours.

It is observed that the finding of coagulase-positive staphylococci on cervical culture is serious since general invasion occurs in about 30 per cent of such cases, and that such a finding is an indication for the early institution of massive penicillin dosage.

J. A. Chalmers

INFANT

2172. **The Offspring of Elderly Primiparae with Particular Reference to their Index of Vitality.** (I neonati da primipara attempta con particolare riferimento al loro indice di vitalità.)

By P. BAILO. *Ann. Ostet. Ginec.*, **73**, 82–96, Jan. 1951. 42 refs.

2173. **The Healthy Child: its Many Disguises.**

By I. GORDON. *Brit. med. J.*, **1**, 611–614, Mar. 24, 1951. 18 refs.

A plea is made for the recognition that many of the common complaints and findings met with in infant welfare and school clinics interfere with neither health nor development. Treatment in the majority of cases is therefore unnecessary and much public money and doctors' time could thereby be saved. Enlarged tonsils, orthopaedic defects, phimosis, constipation in breast-fed babies, and innocuous cardiac murmurs form the largest group and are specially discussed. Mention is made of 74 other symptoms and signs which cause anxiety to both parents and unknowing doctors. Included with them are such paediatric problems as the "won't-eat neurosis" and the infant with a stridor. The vexed question "what is health?" is answered as follows: "We are healthy if we (*a*) feel well, (*b*) function well, and (*c*) if the objective signs of imperfection which we all can provide are such as, besides allowing (*a*) and (*b*) in the present, give reasonable confidence that we may feel well and function well in the not-too-distant foreseeable future."

David Morris

2174. **Primary Sex Ratio and Sex Ratio at Birth.** (Den Primära könsproportionen och könsproportionen vid födelsen.)

By G. DAHLBERG. *Nord. Med.*, **45**, 190–192, Feb. 7, 1951. 12 refs.

2175. **The Influence of Maternal and Obstetrical Factors on Fetal Survival.**

By J. L. FITZGERALD, G. N. FERRIS, and T. E. TOSHACH. *Amer. J. med. Sci.*, **222**, 40–45, July 1951. 15 refs.

2176. **Experimental Contribution to the Biology of the Vernix Caseosa.** (Contributo sperimentale alla biologia della vernice caseosa.)

By P. MARZIALE. *Clin. ostet. ginec.*, **53**, 65–74, Apr. 1951. 2 figs., 23 refs.

2177. **The Urinary Excretion of 17-Ketosteroids by the Newborn.** (Die Ausscheidung der 17-Ketosteroide im Harn des Neugeborenen.)

By E. PHILIPP and M. SOETBEER. *Med. Welt*, **20**, 301–304, Mar. 10, 1951. 1 fig., 19 refs.

2178. **The Identification of Newborn Babies by Means of the Foot-Print.** (L'identificazione del neonato mediante l'impronta della pianta del piede.)

By P. ALFIERI. *Minerva ginec.*, **3**, 121–123, Mar. 1951. 2 figs.

2179. **Characteristics of the Unipolar precordial Electrocardiogram in Normal Infants.**

By R. F. ZEIGLER. *Circulation*, **3**, 438–443, Mar. 1951. 4 figs.

Unipolar precordial leads were recorded in 145 normal infants from birth to the age of 3 years. Analysis of these revealed evidence of a normal degree of right ventricular preponderance at this age, as exemplified by large amplitude and late onset of the intrinsic deflection in leads from the right side of the praecordium. The characteristic features of the T wave include upright T waves in V_1 and inverted T waves in V_5 and V_6 during the first 24 hours after birth. During the next 48 to 72 hours there is progressive inversion of T in V_1 and V_2, and elevation in V_5 and V_6. In older infants and young children there is slight to moderate elevation of the S–T segment, with multiphasic or inverted T waves in leads from the right and mid-praecordium, and upright T waves in leads from the left praecordium. Emphasis is laid upon the value of these criteria of normality in the diagnosis of congenital heart disease.

William A. R. Thomson

2180. **Adrenal Cortex Extract in Pediatrics. Possible Effect on the Respiratory System of the Newborn.**

By R. W. PROVENZANO, P. MCGOVERN, R. SCHULTZ, and J. HESTER. *Amer. J. Dis. Child.*, **81**, 323–328, Mar. 1951. 1 fig., 11 refs.

The authors investigated the effect of adrenal cortical extract on the respiratory system of the newborn infant in the Cambridge City Hospital, Cambridge, Mass., and in the St Elizabeth Hospital, Brighton, Mass. The cases were divided into 3 groups. The first, made up of 40 children, was examined clinically and radiologically. The second, of 336 children, was subjected to clinical examination only. The third group, of 72 infants, was made up of cases of anoxaemia and atelectasis and was uncontrolled. To alternate cases of the first 2 groups 2 ml. of adrenal extract containing 50 dog units per ml. was given hypodermically at birth, at 2 hours, and at the sixth hour.

A reduced incidence of rales in the chest was noted in both groups in those children who had received cortical extract as compared with the control series, but in the first group radiology did not show any difference. Of the second group, 24 had well-marked respiratory symptoms, and again those receiving hormone treatment showed a higher incidence, and a more rapid rate, of recovery than the control series. The third group of babies received adrenal cortical extract, but in some therapy was continued longer than in the other series. The authors noted a satisfactory clinical response, but no comparable untreated series was available for comparison.

[In the control series no information is given as to whether injections of inactive material were given in the same manner as the adrenal cortical extract, and if this were not so, it is to be wondered whether the stimulation and handling inseparable from such procedures could have affected the results.] *H. F. Farquhar*

2181. **Natal and Neonatal Teeth.** (Dentito natalis et neonatalis.)

By T. WALTER. *Nord. Med.*, **45**, 189–190, Feb. 7, 1951. 11 refs.

2182. **The Pyruvic Acid Content of the Blood in the first Hours of Life.** (Ueber den Brenztraubensäuregehalt des Blutes wahrend der ersten Lebensstunden.)

By K. SCHREIER and R. DANKWART. *Klin. Wschr.*, **29**, 263, Apr. 1, 1951. 8 refs.

2183. **A Case of Acardiac "Foetus in Foetu."** ("Foetus in Foetu" acardico. Considerações em tôrno de um caso.)

By L. C. U. JUNQUEIRA and V. A. DE CARVALHO PINTO. *Rev. paulist. Med.*, **38**, 118–122, Feb. 1951, 4 figs., 3 refs.

2184. **Foetal Osteogenesis Imperfecta.** (Osteogenesi imperfetta fetale.)

By A. VALLIANI and L. DE CAMILLIS. *Clin. ostet. ginec.*, **53**, 1–24, Feb. 1951. 10 figs., bibliography.

2185. **Congenital Paralysis of the Abducens Nerve and Inferior Rectus Muscle.** (Paralysis congenita del abducens y recto inferior izquierdos.)

By J. A. RAMÍREZ. *Rev. Policlín. Caracás*, **19**, 23–30, Jan.–Feb. 1951. 1 fig., 9 refs.

2186. **A Histological Study of "Hyaline Membranes" Occurring in the Newborn Lung.** (Etude histologique des "membranes hyalines" dans les poumons de nouveau-nés.)

By N. BOVET-DU BOIS. *Schweiz. Z. allg. Path.*, **14**, 261–274, 1951. 4 figs., 24 refs.

2187. **Obstruction of the Upper Gastrointestinal Tract in the Newborn.**

By H. E. PATERS. *West. J. Surg. Obstet. Gynec.*, **59**, 303–308, June 1951. 4 figs., 15 refs.

2188. **The Use of Potassium Chloride in the Preoperative Treatment of Pyloric Stenosis in Infants.**

By F. M. MATEER, L. GREENMAN, A. C. AUSTIN, J. H. PETERS, H. MERMELSTEIN, F. WEIGAND, and T. S. DANOWSKI. *Amer. J. med. Sci.*, **221**, 21–27, Jan. 1951. 2 figs., 28 refs.

In this paper from the University of Pittsburg a study of pre- and post-operative electrolyte balance is reported, made on 6 infants between the second and eleventh weeks of life suffering from vomiting due to pyloric stenosis. By techniques previously described, extra- and intracellular concentrations of sodium and potassium were estimated as well as extracellular fluid, intracellular nitrogen, and blood non-protein nitrogen, chloride, bicarbonate, sodium, and potassium levels.

The following results were obtained. During recovery from vomiting, retention of sodium, potassium, and chloride occurred, but the nitrogen balance remained negative for some time, probably because of lack of milk protein in the early period of treatment. Extracellular sodium content increased markedly, the intracellular sodium content falling: extracellular potassium content rose slightly, whereas its intracellular concentration rose. These changes were recorded after the intravenous infusion of sodium and potassium chloride solutions had been started pre-operatively. Blood potassium levels varied.

Comparison with a group of infants kept on potassium-free fluids under similar conditions to those here described revealed that a positive intracellular potassium balance was attained much earlier in those receiving potassium. This return to normal, associated with resumption of normal feeding in the group not receiving parenteral potassium and characteristic of restoration of body fluids and electrolytes to physiological levels, is highly desirable and may be accelerated by potassium administration in these cases. A solution of 35 mEq. of potassium chloride per litre of 5 per cent glucose is recommended.

A. T. Macqueen

2189. **Intestinal Obstruction in the Newborn and the Infant. Diagnosis and Surgical Management.**

By O. S. WYATT. *J. Amer. med. Ass.*, **146**, 236–240, May 19, 1951.

2190. **Vitamin B_{12}, a Factor in Prevention of Hydrocephalus in Infant Rats.**

By B. L. O'DELL, J. R. WHITELEY, and A. G. HOGAN. *Proc. Soc. exp. Biol., N.Y.*, **76**, 349–353, Feb. 1951. 1 fig., 6 refs.

It was found some years ago that feeding rats on a synthetic diet containing casein as the only source of protein causes hydrocephalus in about 2 per cent of the offspring. The present authors have shown earlier that this is due to a nutritional deficiency and that it could be prevented by the addition of aqueous liver extract, and in some instances also by the addition of folic acid, to the diet. They observed an increase in the incidence of hydrocephalus up to 20 per cent in the offspring when a folic acid inhibitor, crude methylpteroylglutamic acid (methyl P.G.A.), was added to a diet that contained soy-bean oil meal as the source of protein. The type of diet consumed during the pre-experimental period had a marked effect on the incidence, and this suggests that the protective factor may be stored in the mother rats.

To test the importance of vitamin B_{12} 3 groups of rats were used. Group I was maintained on a basal diet free of vitamin B_{12} for at least 3 months in order to deplete them of the protective factor. Afterwards, during the experimental period, the animals received the same diet to which crude methyl P.G.A. was added. Group II was not depleted but received the same diet as Group I. Group III was also not depleted, but received vitamin-B_{12} concentrate in addition to methyl P.G.A. in the diet. The incidence of hydrocephalus was 23 per cent in the offspring of Group I, 15 per cent in Group II. The same difference was seen in the second litters, but after the third litter there was very little difference. In Group III (vitamin B_{12} added) no hydrocephalus was observed amongst the 1,261 offspring. In order to verify that vitamin B_{12} was responsible for this protection, and not some other factor in the concentrate, crystalline vitamin B_{12} was injected into 5 female rats that had produced at least 3 consecutive litters with hydrocephalus. No hydrocephalic offspring were observed. Efforts were made to determine when vitamin B_{12} had to be injected in order to prevent the abnormality; the damage occurred after the seventh day of gestation, probably about the twelfth to fourteenth days.

Addition of folic acid in the absence of vitamin B_{12} could not prevent the abnormality.

Z. A. Leitner

2191. **Statistical Study of the Premature Infant.**

By M. BOGIN and K. S. EDGAR. *Connecticut med. J.*, **15**, 569–572, July 1951. 6 refs.

2192. **The Feeding of Premature Infants. The Value of High Caloric Diets in Reducing the Length of Hospital Stay.**

By J. B. HARDY and E. O. GOLDSTEIN. *J. Pediat.*, **38**, 154–157, Feb. 1951. 2 refs.

The growth of 3 groups of premature infants was compared. Group A, consisting of 47 infants in the

Harriet Lane Hospital, were fed on partially skimmed milk with 10 per cent " dextrimaltose ", giving a caloric value of 1 calorie per ml.; of this an amount was given equivalent to 120 to 130 calories per kg. body weight per day. Group B, consisting of 51 infants, were treated similarly to Group A except that after the first 2 weeks each infant was given as much of the diet as desired. The caloric intake in this group varied from 121 to 195 calories per kg. per day. Group C, 47 infants in the Sinai Hospital, were fed half-skimmed milk with 7.5 per cent dextrimaltose, giving a caloric value of 0.85 calorie per ml. Of this the infant was given as much as was desired from the second or third day. The caloric intake on this regimen varied from 153 to 246 calories per kg. per day.

The infants in Group C on a " self-demand " regimen made the most rapid weight gains and required the shortest time in hospital. The infants in Group A gained most slowly and remained the longest time in hospital. No ill effects were noted from the self-demand regimen.

Douglas Gairdner

2193. **Vitamin E Blood Levels in Premature and Full Term Infants.**

By S. W. WRIGHT, L. J. FILER, and K. E. MASON. *Pediatrics*, **7**, 386–393, Mar. 1951. 2 figs., 12 refs.

Blood samples were taken from infants weighing more than 2.25 kg. on the first or second day of life before the first feed, and also on the fourth and sixth days of life; later, samples were also taken from premature infants weighing between 0.78 and 2.25 kg. and from the mothers of these infants, 28 of whom nursed their babies, while 23 did not. The total tocopherol content of the serum was determined. The tocopherol content of the blood of non-nursing mothers varied between 1.18 and 2.05 mg. per 100 ml., and that of nursing mothers between 1.36 and 1.86 mg. per 100 ml. The values for breast-fed infants were 0.38 mg. per 100 ml. on the 2nd day and 1.46 mg. on the sixth, and the average was 1.35 mg. per 100 ml. of blood at 5 to 8 months. The value for bottle-fed infants was 0.37 per 100 ml. on the second day; it remained relatively steady at about 0.5 mg. per 100 ml. blood up to the fourth month and rose slightly to 0.75 mg. per 100 ml. between the fifth and eighth months of age. The level in premature infants fell steadily from 0.43 mg. during the first 10 days of life to 0.09 mg. per 100 ml. blood at the fortieth day of life.

H. E. Magee

2194. **Chicago Plan for Care of Premature Infants.**

By J. H. HESS. *J. Amer. med. Ass.*, **146**, 891–893, July 7, 1951.

2195. **Haemopoiesis in Siderosis in the Foetus and Newborn.**

By F. R. LANGLEY. *Arch. Dis. Child.*, **26**, 64–75, Feb. 1951. 4 figs., 44 refs.

A study was made of the amount of erythropoietic tissue and stainable free iron in the organs of the newborn; the results are described, and form the basis of a reconsideration of the changes in the haematopoietic system at birth. Sections of liver, spleen, and kidney were examined from 92 infants, 18 of whom were stillborn and 74 ranging in age at death from 10 minutes to 7 months. Of the total, 48 were premature and 44 full-time infants. In none was there evidence of haemolytic disease. The limits of prematurity were 38 weeks' gestation and 48 cm. crown–heel measurement. Among stillborn infants the mean content of haematopoietic foci in the liver was clearly greater in the premature group, though no relationship emerged between amount of haematopoietic tissue and the degree of prematurity. Prenatal recession of erythrocyte production occurred in the 38th and 40th weeks.

In the liveborn group a process of post-natal recession began at 2 to 3 days of age and was complete about the eighth day in full-time infants, but was prolonged by prematurity, according to its degree, up to 38 days duration. This period was considerably less than the number of days of prematurity. Postnatal recession differs from the foetal type, and closely follows a logarithmic law. Visible iron pigment was present in the liver in two-thirds of the cases, including half of the stillborn group. No correlation was found between siderosis and prematurity, but siderosis and haematopoiesis occurred more often apart than together. Siderosis was rarely present between the first and third days, increased to the fourth week, and decreased after 3 months. Incidence in the spleen followed that in the liver: there was a positive reaction to iron in only 2 instances in the kidney.

The post-natal fall in the erythrocyte count in the second week of life and the physiological jaundice of the newborn have been attributed to haemolysis. The author regards the former change as reflecting the diminishing haematopoietic function of the liver; the iron supplied for this activity accumulates as less is used, and some is deposited in the spleen. The latter condition may result from immaturity of liver function.

More extensive knowledge of such factors as changes in blood volume at birth, rate of production of both liver and marrow erythrocytes and their attributes, is required before the part, if any, played by haemolysis can be assessed.

V. Reade

2196. **A Contribution to the Pathogenesis of Haemolytic Disease of the Newborn: Maternal Isoimmunization with a Clinically Healthy Child.** (Contributo alla patogenesi della malattia emolitica: Isoimmunizzazione maternal con prole clinicamento sana.)

By T. G. FORMAGGIO and P. SORA. *Minerva ginec.*, **3**, 139–149, Apr. 1951. Bibliography.

2197. **Foetal Erythroblastosis due to Rh-Sensitization by very Small Amounts of Blood.** (Fetale Erythroblastose nach Rh-Sensibilisierung durch kleinste Blutmengen.)

By G. STARK. *Dtsch. med. Wschr.*, **76**, 517–518, Apr. 13, 1951. 1 fig., 35 refs.

2198. **ABO Incompatibility of Mother and Foetus. A Case of Kernicterus due to Maternal anti B isoimmunization.** (Incompatibilità materno-fetale nel sistema ABO. Un caso di ittero nucleare da isoimmunizzazione materna anti B.)

By G. SICILIANO and M. MITTIGA. *Clin. ostet. ginec.*, **53**, 25–38, Feb. 1951. 40 refs.

2199. **Aetiology of Physiological Jaundice of the Newborn.**

By A. S. WIENER. *Brit. med. J.*, **1**, 435–436, Mar. 3, 1951. 14 refs.

It is suggested that physiological jaundice of the newborn is due to the action of auto-agglutinins (cold agglutinins) of maternal origin acting on the cells of the foetus. *G. Discombe*

2200. **Microscopical Studies of the Placenta in Erythroblastosis.** (Mikroskopische Untersuchungen an Erythroblastoseplacenten.)

By W. BICKENBACH and F. KIVEL. *Arch. Gynäk.*, **177**, 559–567, 1950. 9 figs., 20 refs.

The histological appearances of 4 placentae from erythroblastotic foetuses were compared with those of 10 placentae from healthy foetuses, with a view to studying the effectiveness of the placenta as a barrier to foetal erythrocytes.

In 4 out of the 10 healthy placentae and in all 4 erythroblastotic placentae, erythroblasts (which were obviously of foetal origin) were found in the intervillous spaces, and in 2 of the healthy placentae it was possible to demonstrate actual communications between the vessels of the villi and the intervillous space.

The authors do not think that these findings [which are illustrated by a number of convincing photomicrographs] are due to artefacts such as transportation of foetal cells by the microtome knife. The fact that no sensitization occurs although there is a seeping-through of foetal erythrocytes into the maternal circulation in a certain percentage of healthy foetuses is explained by the absence of a factor [Wiener's "factor K"] which predisposes the mother to the formation of antibodies. [But see *J. Obstet. Gynaec. Brit. Emp.*, 1950, **57**, 119, on "silent haemolytic disease of the newborn".] *N. Alders*

2201. **The Severity of Congenital Syphilitic Infection in Children Born of Mothers Treated or Untreated During Pregnancy.** (Inverkar luesterapi under graviditet på prognosen for barnet?)

By O. ENKVIST. *Nord. Med.*, **45**, 192–194, Feb. 7, 1951. 3 refs.

2202. **Intrauterine Meningitis as a Cause of Hydrocephalus.**

By R. M. N. CROSBY, W. H. MOSSBERG, and G. W. SMITH. *J. Pediat.*, **39**, 94–101, July 1951. 4 figs., 24 refs.

2203. **Acute Specific Peritonitis in Infancy.** (Las peritonitis agudas especificas in la infancia.)

By L. G. SALISACHS. *Acta pediatr. esp.*, **97**, 27–43, Jan. 1951. 4 figs., 1 ref.

The differential diagnosis of peritonitis caused by tubercle bacilli, pneumococci, gonococci, and streptococci is considered, especially in relation to appendicitis. Surgical intervention in the early stages of these specific forms of peritonitis is contra-indicated. Before the use of antibiotics the mortality from pneumococcal peritonitis was very high; now, after treatment has been begun with penicillin or streptomycin, an exploratory paracentesis is safe and is of diagnostic value. A correct technique for such an examination is described and the chief clinical and pathological features of each type of peritonitis are discussed. *G. M. Findlay*

2204. **The Metabolism of Iron during Suckling.**

By R. A. MCCANCE and E. M. WIDDOWSON. *J. Physiol. Lond.*, **112**, 450–458, Feb. 20, 1951. 1 fig., 25 refs.

The total amount of iron in the bodies of mice, rats, kittens, and piglets increased during suckling. The piglets obtained this additional iron from their surroundings, the other species from their mother's milk. The liver of rabbits contains large amounts of iron at birth; this iron is not withdrawn during suckling and the animals become anaemic, as little iron is absorbed from the intestines. The iron content of the liver falls in the suckling period, partly due to liver growth; except in the rabbit, the liver iron at birth is only a small fraction of the whole body iron. The percentage of iron in the blood of kittens and piglets fell during growth, and the percentage of iron in the extravascular and extrahepatic tissues increased. It is calculated that in human infants the body iron should increase by 40 per cent in the suckling period, the iron being provided in the mother's milk. *A. Schwetzer*

2205. **The Conservation of Breast Milk with Aureomycin.** (Zur Frage einer Frauenmilchkonservierung mit Aureomycin.)

By H. W. OCKLITZ and E. F. SCHMIDT. *Arch. Kinderheilk.*, **142**, 21–33, 1951. 6 figs., 9 refs.

2206. **Stillbirths, Neo-natal Deaths, and Premature Births in Western Australia.**

By D. J. R. SNOW and A. T. PEARSON. *Med. J. Aust.*, **1**, 856–859, June 16, 1951.

2207. **The Nature of the Decline in the Loss of Infant and Foetal Life: A Study in Western Australia Vital Statistics.**
By J. C. EDWARDS. *Med. J. Aust.*, **1**, 853–856, June 16, 1951. 1 fig., 4 refs.

2208. **Nation-wide Plan for Reduction of Premature Mortality.**
By L. BAUMGARTNER. *J. Amer. med. Ass.*, **146**, 893–896, July 7, 1951.

2209. **Pilot Study of Maternal and Neonatal Factors in Premature Infant Mortality.**
By H. M. WALLACE, H. RASCOFF, and H. KNOBLOCH. *J. Amer. med. Ass.*, **146**, 886–891, July 7, 1951. 1 fig., 16 refs.

MATERNAL MORBIDITY, MORTALITY

2210. **Cholecystitis and Cholelithiasis in Young Women following Pregnancy.**
By W. H. GERWIG and J. R. THISTLETHWAITE. *Surgery*, **28**, 983–996, Dec. 1950. 6 figs., 10 refs.
The authors have collected 10 cases of cholelithiasis in young women under 30 whose symptoms seemed to date from previous pregnancies. The well-known features and complications of the disease are described, and it is urged that early operation is the correct procedure in order to avoid recurrent disability and more serious complications.
J. Marshall Pullan

2211. **Pulmonary Embolism of Amniotic Fluid. Report of Case with Review of Literature.**
By S. M. BOUTON and J. R. SAUNDERS. *Amer. J. clin. Path.*, **21**, 566–572, June 1951. 4 figs., 21 refs.

2212. **Maternal and Infant Mortality.**
By R. H. FAGAN. *West. J. Surg. Obstet. Gynec.*, **59**, 324–329, July 1951. 3 figs., 12 refs.

2213. **Maternal Mortality at Milwaukee Hospital.**
By F. J. HOFMEISTER and J. G. STOUFFER. *Amer. J. Obstet. Gynec.*, **62**, 177–184, July 1951. 1 fig., 4 refs.

OBSTETRIC OPERATIONS

2214. **The Anatomical and Physiological Basis of Episiotomy.** (Episiotomia—Suas bases anatomo-fisiológicas.)
By L. R. L. DE GOUVÊA. *Arch. brasil. Med.*, **40**, 225–242, July-Aug. 1950. 15 figs.

2215. **A Modified Technique of Episiotomy.** (Modificación a la técnica de episiotomía.)
By A. MARVAN. *Ginec. Obstet. Méx.*, **6**, 3–8, Jan.-Feb. 1951. 9 figs.

2216. **Fetal Trauma from Forceps Delivery.**
By T. S. LLOYD, S. V. WARD, and T. B. SELLERS. *Amer. J. Obstet. Gynec.*, **62**, 129–134, July 1951. 3 refs.

2217. **A Modification of Kielland's Forceps facilitating the Direct Application of the Anterior Blade.** (Modificacion del forceps de Kielland para facilitar la applicacion directa de la cuchara anterior.)
By J. M. DEXEUS TRAIS DE BES. *Toko-ginec. Pract.*, **10**, 276–279, May 1951. 3 figs.

2218. **Barton's Forceps.** (Forceps de Barton.)
By J. J. PIZARRO, F. PARANHOS, and F. RODRIGUES. *Rev. Ginec. Obstet.*, **45**, 9–28, Jan. 1951. 6 figs., 18 refs.

2219. **Cesarean Sections in Iowa in 1949.**
By M. M. DONNELLY. *J. Iowa med. Soc.*, **41**, 252–257, July 1951. 2 figs., 12 refs.

2220. **The Future Use of the Caesarean Section in Obstetrics.** (El futuro obstetrico de las operadas de cesárea.)
By V. MANUEL AVILÉS B. *Obstet. Ginec. lat.-amer.*, **9**, 148–161, May 1951.

2221. **Broadening of the Indications for Caesarean Section.** (Ampliacion de las indicaciones de la operacion cesarea.)
By J. BAZAN. *Prenza med. argent.*, **38**, 111–116, Jan. 1951.

2222. **The Widening of the Indications for Caesarean Section under the Protection of Penicillin.** (Erweiterung der Indikation zum Kaiserschnitt durch Penicillinschutz.)
By E. v. SCHUBERT. *Arztl. Wschr.*, **6**, 464–466, May 18, 1951.

2223. **The Curved Incision in Segmental Caesarean Section and its advantages.** (La incision arciforme en la cesarea segmentaria. Sus ventajas.)
By C. E. DE LA COLINA and A. HEITZMANN. *Rev. Med. Cienc. af.*, **13**, 1–3, Jan.-Feb.-Mar. 1951. 4 figs.

2224. **Fetal Mortalities in Cesarean Sections.**
By H. R. LITCHFIELD, S. D. STERNBERG, C. HOFFMAN, and R. TURIN. *N.Y. St. J. Med.*, **51**, 1517–1518, June 15, 1951. 14 refs.

GYNAECOLOGY

2225. **Some Problems in the Private Practice of Gynecology and Obstetrics. A Clinical Statistical Study.**
By R. L. HOFFMAN. *West. J. Surg. Obstet. Gynec.*, **59**, 275–287, June 1951.

2226. **Psychomatic Gynaecology.** (Ueber Psychosomatic in der Gynäkologie.)
By E. KEHRER. *Artzl. Forsch.*, **5**, 301–313, July 10, 1951.

2227. **The Significance of Backache in Gynaecology.** (Zur Bewertung des Kreuzschmerzes in der Gynäkologie.)

By R. ZIMMERMANN. *Dtsch. GesundhWes.*, **6**, 454–455, Apr. 19, 1951.

2228. **Erosion of the Cervix and Low Back Pain.** (Erose a bolesti v kříži.)

By E. ROCH. *Lék. Listy*, **6**, 384–386, June 1, 1951. 11 refs.

2229. **Experimental Study of the Lesions Caused by Ultrasonic Vibrations in the Ovary.** (Lesioni determinate dagli ultrasuoni sull'ovaio.)

By L. CAMPI and G. VOGHERA. *Minerva ginec.*, **3**, 109–113, Mar. 1951. 7 figs., 9 refs.

DISORDERS OF FUNCTION

2230. **Rectal Calcium Treatment in Gynaecology.** (Rektale Kalziumapplikation in der Frauenheilkunde.)

By H. KRAUBIG. *Zbl. Gynäk.*, **73**, 1020–1031, 1951. 24 refs.

2231. **Experimental Lesions caused by Oestrogen.** (Sur la pathologie expérimentale d'origine oestrogène.)

By M. MOSINGER. *Rev. franç. Gynéc.*, **46**, 69–83, Mar.-Apr. 1951. 5 figs.

2232. **Alleged Hyperfolliculinism.** (L'hyperfolliculinie alléguée.)

By A. NETTER, R. HENRY, A. LAMBERT, and S. TROISIER. *Presse méd.*, **59**, 889–890, June 23, 1951.

2233. **Assay, Effects and Evaluation of Ethinyl Oestradiol.** (Testierung, Wirkung und Bewertung des Aethinylöstradiols (Progynon C).)

By H. HAHN. *Zbl. Gynäk.*, **73**, 781–792, 1951. 7 figs., 45 refs.

2234. **Effect and Employment of Ethinyl Oestradiol.** (Wirkung und Anwendung des Aethinylöstradiol.)

By J. P. EMMRICH. *Zbl. Gynäk.*, **73**, 776–781, 1951. 8 figs., 3 refs.

2235. **The Mode of Action of Oestradiol.** (Beitrag zur Wirkungsweise von Oestradiol.)

By E. KNAKE. *Virchows Arch.*, **319**, 547–550, 1951. 9 refs.

2236. **The Excretion of Pregnanediol and 17-ketosteroids during the Menstrual Cycle in Benign Hirsutism.**

By W. H. H. MERIVALE. *J. clin. Path.*, **4**, 78–84, Feb. 1951. 25 refs.

This paper from the Department of Clinical Pathology, Guy's Hospital, London, based on the work of Koets (*J. clin. Endrocrinol.*, 1949, **9**, 795), confirms the cyclical fluctuation of 17-ketosteroid excretion in women with benign hirsutism, but shows that the peak of excretion occurs during luteal activity, as demonstrated by pregnanediol excretion. This relationship may be due to an abnormality of progesterone metabolism. From 4 controls and from 10 women with hirsutism, 24-hour specimens of urine were collected on the 7th, 14th, 21st and, where possible, between the 25th and 28th days after the onset of menstruation. The methods of estimating excretion of pregnanediol, 17-ketosteroids, and creatinine to exclude incomplete urine collection are given and the results tabulated. Three of the controls ovulated. The 17-ketosteroid excretion in the 4 controls varied by a maximum of 3.3 mg. Of the 10 patients with hirsutism 7 ovulated and the peak of the 17-ketosteroid excretion coincided with that of the pregnanediol. The maximum variation in 17-ketosteroid excretion was 21.7 mg. One patient did not ovulate and the 17-ketosteroid excretion decreased during the cycle. One patient with a history of 13 months' amenorrhoea consistently had a high excretion of pregnanediol and 17-ketosteroid. The possibility of adrenal hyperplasia is considered. In one case the confirmation of luteal activity was doubtful owing to an incomplete urine specimen.

D. W. Higson

2237. **Endogenous Allergy to Steroid Hormones. The Nature of Certain Disorders Related to Ovarian Function.**

By G. P. HECKEL. *Surg. Gynec. Obstet.*, **92**, 191–208, Feb. 1951. 4 figs., 16 refs.

An extensive study of allergy to steroid hormones is reported. Over 250 cases are recorded in which skin tests with different steroid hormones were performed and the results noted. The importance of the oily vehicle for the hormone is emphasized. Results show that positive reactions may be obtained in apparently normal individuals of both sexes, and that sensitivity of the skin to the steroid is variable and non-specific. Most sensitive individuals will react to several steroids, and different results may be obtained with repeated tests. The clinical significance of the article lies in the possible relation of steroid allergy to various, as yet ill-defined, biological syndromes; the author believes that steroid allergy is a remarkably common condition. In his opinion it accounts not only for the premenstrual-tension syndrome, but also for ovarian pain, chronic mastitis, and some symptoms of the climacteric. Evidence is given in support of this view, and he records considerable clinical improvement after hyposensitization by injection of very small doses of the steroids concerned. He also discusses the therapeutic value of larger doses of similar steroids in certain cases.

[This article will prove important if subsequent work confirms that steroid allergy is, in fact, as common as the author indicates, particularly if his treatment with minimal doses should prove effective in controlling symptoms in these patients, who are notoriously difficult to treat by more conventional measures, and whose symptoms are so frequently considered to be functional.]

W. G. Mills

2238. **Relation of 17-ketosteroid Excretion to the Completeness of the Virilizing Syndrome.**
By L. M. Bayer and P. Koets. *Amer. J. med. Sci.*, **222**, 13–17, July 1951. 2 figs., 9 refs.

2239. **Experimental and Clinical Researches on Dehydro-androsterone.** (Ricerche sperimentali e cliniche sul deidroandrosterone.)
By M. Goisis and A. Pardi. *Ann. Ostet. Ginec.*, **73**, 142–156, Jan. 1951. 2 figs., 37 refs.

2240. **Erythrophagocytosis and Blood in the Peritoneal Fluid of Gynaecological Patients.** (Das Vorkommen von Erythrophagozytose und Blut in der Peritonealflüssigkeit bei gynäkologischen Kranken.)
By W. Heyde. *Zbl. Gynäk.*, **73**, 1123–1130, 1951. 5 figs., bibliography.

2241. **A Contribution to the Study of Haemoperitoneum of Ovarian Origin.** (Contributo allo studio dell'empoperitoneo d'origine ovarica.)
By M. Pagliari. *Minerva ginec.*, **3**, 168–171, Apr. 1951. 3 figs., 34 refs.

2242. **A Study of Basal Metabolism in Ovarian Dysfunction.** (Estudio del metabolismo basal en las disfunciones ováricas.)
By J. J. de la Maza y Lobo. *Rev. med.-quirurg. Oriente*, **10**, 202–204, Dec. 1950.

2243. **Treatment of Ovarian Insufficiency and its Sequelae by Injection of "Cyren B" Crystal Suspensions.** (Die Behandlung der Ovarialinsuffizienz und ihrer Folge-zustände mit Injektion von Cyren-B-Kristall-Suspensionen.)
By W. Holtkamp. *Zbl. Gynäk.*, **73**, 771–776, 1951. 13 refs.

2244. **The Treatment of Premenstrual Depression.** (Die Behandlung prämenstrueller Verstimmungen.)
By C. Haffter. *Schweiz. med. Wschr.*, **81**, 525–527, June 2, 1951. 6 refs.

2245. **The Treatment of Premenstrual Tension with Vitamin A.** (Tratamiento de la tension premenstrual con vitamina A.)
By J. Argonz and C. Abinzano. *Rev. méd. Córdoba*, **39**, 181–186, Apr. 1951. 7 refs.

2246. **Diagnosis and Treatment of Amenorrhoea.** (Diagnostico y tratamiento de la amenorreas.)
By J. A. Garzon Abad. *Toko-ginec. pract.*, **10**, 106–127, Feb. 1951. Bibliography.

2247. **Amenorrhoea in Anorexia Nervosa. Clinical, Biological, and Biochemical Aspects.** (L'aménorrhée des anorexies mentales; notions cliniques étude biologique et biochemique.)
By J. Decourt, M. F. Jayle, G. H. Lavergne, and J. P. Michard. *Ann. Endocrinol., Paris*, **11**, 571–592, 1950. 34 refs.

A clinical study has been made of 32 cases of anorexia nervosa with amenorrhoea. It was clear that the amenorrhoea often appeared early in the

controls and from 10 women with hirsutism, 24-effect in the first instance rather than the result of malnutrition. In many cases psychiatric treatment, if sufficiently prolonged, was successful in re-establishing the menses and the return to normal weight of the patient; in other cases hormone therapy was necessary.

Laboratory investigation was carried out in 15 of the patients. Both the vaginal cytology and the output of urinary steroids showed a deficiency of oestrogens and progesterone as a result of ovarian insufficiency, the output of female sex hormones being normal in all but 2 patients.

In some cases the menstrual flow had been interrupted by a violent emotional shock and later the amenorrhea-anorexia-emaciation syndrome had set in. Hence sympathetic stimulation was the primary cause and the endocrine disturbance was a secondary factor. The fact that the 17-ketosteroid output was normal or even raised indicated that there was adequate secretion of adrenocorticotrophic hormone and that hypophyseal failure was not responsible for the condition. However, in cases where the amenorrhoea and emaciation had lasted for many years the malnutrition had aggravated the endocrine insufficiency and led to pituitary dysfunction, so that the clinical picture was identical with that of Simmonds's disease. The success of psychiatric treatment in long-standing cases, however, indicated the psychic origin of the disease. *Nancy Gough*

2248. **Neostigmine and "Priscol" in Functional Amenorrhoea and Early Pregnancy.** (Prostigmin und Priscol bei funktioneller Amenorrhoe und Fruhschwangerschaft.)
By E. Glatthaar and H. Appeli. *Praxis*, **40**, 91–94, Feb. 1, 1951. 23 refs.

The authors give a timely warning that a positive Soskin reaction that is, uterine bleeding after the injection of neostigmine, is only to be expected in "delayed menstruation" and not in profound hormonal disturbances. Failure of bleeding to occur after injection of neostigmine may thus indicate either pregnancy or hormonal dyscrasia.

The authors, at the Gynaecological Clinic of Zürich University, studied 58 patients complaining of amenorrhoea of from 21 to 250 days' duration. 38 of these had functional amenorrhoea, but only 15 responded with genital bleeding to 1 to 3 injections of 1 or 2 mg. of neostigmine. Similar injections were given to 20 pregnant women; in one of them there was slight genital bleeding, but pregnancy continued; 2 others aborted 24 hours and 5 days after the last injection respectively, and a further 2 aborted 1 month after the injection. While miscarriage in these last 2 cases was not considered to have been caused by the injections, the first 2 miscarriages were ascribed to the action of neostigmine.

In a further series of 12 cases "priscol" [dose and route not stated] was administered. In 5 out of 8 cases of functional amenorrhoea cyclical bleeding was re-established; in 1 case of doubtful pregnancy bleeding occurred, and in 3 pregnant women no haemorrhage followed the administration of priscol.

It is concluded that the neostigmine and priscol tests are neither reliable nor safe in the diagnosis of pregnancy. *N. Alders*

2249. **Follicular Hormone and Its Intra-uterine Use.** (L'hormone folliculaire et ses applications intra-utérines.)

By T. KÁROLYI. *Gynaecologia, Basel,* **131**, 119–126, Feb. 1951. 5 refs.

Follicular hormone given parenterally in cases of primary and secondary amenorrhoea has hitherto given disappointing results. This is due to inactivation of much of the hormone by the liver. Administration of a dose direct into the uterine cavity eliminates the liver factor and produces a direct effect on the genital organs. Long-lasting and curative effects are produced with comparatively small doses, such as 1 ml. (50,000 units) "ovocyclin P", given direct into uterine cavity on three alternate days, with 10,000 units orally of an intramuscular preparation of oestrogen on intervening days. No dangers or difficulties of administration have been encountered: 4 successfully treated case of oligomenorrhoea are described. *D. M. Sheppard*

2250. **Causal Therapy of Secondary Amenorrhoea with Neostigmine.** (Kausale Therapie der sekundären Amenorrhoe mit Prostigmin.)

By E. GITSCH. *Zbl. Gynäk.*, **73**, 792–797, 1951. 16 refs.

2251. **The Value of Pituitary Implantation as a Method of Treating Secondary Amenorrhoea** (Ueber den Wert der Hypophysenimplantation als Behandlungsmethode sekundärer Amenorrhoen.)

By H. ZACHERI. *Wien. klin. Wschr.*, **63**, 106–107, Feb. 2, 1951. 7 refs.

2252. **Ureteric Dysmenorrhoea.**

By G. D. READ. *Lancet* **1**, 312–315, Feb. 10, 1951. 2 figs., 17 refs.

The author considers 3 cases of severe dysmenorrhoea at the onset of menstruation, for which no cause could be found in the reproductive organs; ureteric spasm or stricture was found in each case.

In these cases he first carried out a vaginal examination under anaesthesia, followed by cytoscopy and retrograde pyleography and, if necessary, a dilatation of the ureters with Braasch bulbs up to size 22 to 24. If any obvious infection was discovered, 4 to 5 ml. of 2 per cent "argyrol" (silver proteinate) was instilled into each ureter and penicillin (500,000 units) given intramuscularly in a single dose, unless the infection was believed to be due to a penicillin-resistant organism, when 0.5 g. streptomycin was given 6-hourly for 24 hours. The patients, who were all nulliparous, suffered from severe colicky pain at the onset of menstruation, both suprapubically and in the iliac fossae, and in one case radiating to the right loin.

The first patient (aged 36) had ptosis of the right kidney with kinking of the ureter. The dysmenorrhoea was completely cured by nephropexy. The second patient (aged 43) was found to have trigonitis and basal cystitis, with ureteric spasm. Dilatation of the ureters completely cured the dysmenorrhoea. The third patient had trigonitis, ureteritis, and some ureteric narrowing. She was completely cured by dilatation of the ureters. These patients had all been previously treated with drugs and dilatation and curettage without relief.

The author considers that the pain in these cases is ureteric and caused by smooth-muscle spasm and vaso-constriction. Its occurrence at the menses he ascribes to premenstrual pelvic congestion and fear of discomfort anticipated at this time, resulting in sympathetic over-activity. This last increases tension in the smooth muscle and a vicious circle is set up. Dilatation of constricted orifices in the body usually only gives temporary relief, but the author believes that this will establish confidence that the dysmenorrhoea is relieved, hence the vicious circle is broken down.

[The author does not state, in any case, the duration of relief which the patient has had.]
Elaine M. Sunderland

2253. **Edrisal for Relief of Symptoms Associated with Menstruation.**

By R. L. WELLS. *Med. Ann. Distr. Columbia,* **20**, 360–361 and 408, July 1951. 1 ref.

2254. **Clinical Investigations of Premenstrual Symptoms and Functional Dysmenorrhoea.** (Klinisch experimentelle Untersuchungen zur Frage der prämenstruellen Beschwerden und funktionellen Dysmenorrhoe.)

By U. WILBRAND. *Arch. Gynäk.*, **179**, 331–362, 1951. 12 figs., bibliography.

2255. **Contribution to the Treatment of Dysmenorrhoea with "Dismenol."** (Ein Beitrag zur Behandlung der Dysmenorrhoea mit Dismenol.)

By G. MARGGRAFF. *Med. Welt,* **20**, 323–324, Mar. 10, 1951.

2256. **Lumbo-pubic Electric Shock Therapy for Dysmenorrhoea.** (L'elettroshock lombo-pubico nel trattamento delle dismenorree.)

By A. POLONI. *Gazz. med. ital.*, **110**, 116–118, Apr. 1951.

2257. **Migraine and Dysmenorrhoea.** (Jaquecas y dismenorreas.)

By J. S. PUIG. *Rev. clín. esp.*, **41**, 186–191, May 15, 1951. Bibliography.

2258. **Morphological Study of the Endocervical Mucosa in Relation to the Menstrual cycle and to Leucorrhoea.** [In English]

By G. DUPERROY. *Gynaecologia, Basel,* **131**, 73–86, Feb. 1951. 6 figs., 13 refs.

Few descriptions of cyclical changes in cervical mucosa tally closely with one another; the cervix in 36 cases of hysterectomy in patients of childbearing age were therefore investigated pathologically with due regard to day of cycle and the condition of the cervix. Four types of cervical abnormality are described: (1) papillary excrescences; (2) papillary excrescences becoming flattened; (3) flat epithelium with basal vacuoles; (4) "cloudy swelling". The clinical classification was: acute exacerbation of chronic cervicitis, mild chronic cervicitis, leucorrhoea without lesion, no lesion or leucorrhoea. Types (1), (2), and (3) were present in all cervices, irrespective of the day of cycle or degree of cervicitis. No evidence in favour of cyclical changes in cervical mucosa was found. These pathological findings explain discrepancies in the findings of other investigators.

D. M. Sheppard

2259. **Observations on the Leucorrhoea Problem.** (Beitrag zum Fluorproblem.)

By W. SCHEFFLER. *Med. Klinik,* **46**, 236–239, Feb. 23, 1951. 15 refs.

2260. **"Negatol" in Leucorrhoea Treatment.** (Negatol, ett medel mot vaginal fluor.)

By P. BENGTSSON. *Svenska Läkartidn.,* **48**, 876–878, Apr. 13, 1951. 2 refs.

2261. **Functional Uterine Haemorrhage.**

By A. M. SUTHERLAND. *Med. J. Aust.,* **1**, 819–824, June 9, 1951. 10 refs.

2262. **The Treatment of Uterine Haemorrhage by Radiation.**

By C. W. S. JERRAM. *N.Z. med. J.,* **50**, 259–262, June 1951. 6 refs.

2263. **Dangerous Bleeding from a Corpus Luteum.** (Lebensbedrohliche Blutung aus einem Corpus luteum.)

By R. GERSTBERGER. *Zbl. Gynäk.,* **73**, 1044–1050, 1951. 3 figs., 46 refs.

2264. **The Treatment of Gynaecological Bleeding with Gonadotrophic Hormones.** (Zur Therapie gynäkologischer Blutungsstörungen mit gonadotropen Hormonen.)

By W. FOELLMER. *Med. Welt,* **20**, 309–315, Mar. 10, 1951. 39 refs.

2265. **Disintegrating Leucocytes and Monomacrophagocytosis after Irradiation of the Spleen in Cases of Gynaecological Haemorrhage.** (Leukozytäre Abbauformen und Monomakrophagozytose nach Milzbestrahlung bei gynäkologischen Blutungen.)

By H. WAGNER. *Zbl. Gynäk.,* **73**, 1031–1038, 1951. 2 figs., 15 refs.

2266. **Influence of Vitamin A on Post-menopausal Cornification of the Vaginal Epithelium.**

By L. I. PLATT. *Amer. J. clin. Path.,* **21**, 38–40, Jan. 1951. 4 figs., 7 refs.

The presence of highly cornified cells in the vaginal smears of post-menopausal women has been regarded as evidence of oestrogen activity. The author suggests that a deficiency of vitamin A in the diet be regarded as a possible cause of the excessive cornification. Five such patients whose smears showed excessive cornification were investigated at the George Washington University, Washington. Each was given a 14-day course of vitamin A in doses of 100,000 units of the natural ester in corn oil parenterally once or twice a week and 25,000 units of the natural ester in a capsule orally once daily. After treatment the smears resembled those found in normal post-menopausal women—small basal cells; 3 to 5 weeks after discontinuing treatment the excessive cornification was again present in the smears.

D. W. Higson

2267. **The Endocrinology of the Post-climacteric Woman.** (Endocrinologia de la mujer post-climaterica.)

By J. BOTELLA LLUSIÁ. *Toko-ginec. pract.,* **10**, 174–187, Mar. 1951. Bibliography.

2268. **Critical Remarks on the Treatment of Menopausal Conditions with Ovarian Hormones.** (Zur Kritik der Behandlung klimakterischer Folgeerscheinungen mit Ovarialhormon.)

By H. R. SCHMIDT-ELMENDORFF. *Dtsch. med. Wschr.,* **76**, 232–233, Feb. 23, 1951.

2269. **Cytological Methods in the Diagnosis and Treatment of the Menopause.** (Método citológico en el diagnóstico y tratamiento de la menopausia.)

By X. MARTINEZ PACHECO. *Ginec. Obstet. Méx.,* **5**, 453–456, Nov.-Dec. 1950. 8 refs.

2270. **Hypertension and the Menopause.** (Hipertensão arterial e menopausa.)

By J. LEITE. *An. brasil. Ginec.,* **16**, 67–81, Feb. 1951. 22 refs.

2271. **Dietetic Problems of Puberty and the Menopause.** (Problemi dietetici della puberta e della menopausa.)

By P. ALESSANDRINI. *Policlin. (prat.),* **58**, 641–650, May 21, 1951.

2272. **The Sterile Woman.** (La mujer esteril.)

By F. LUQUE. *Toko-ginec. pract.,* **10**, 65–76, Feb. 1951.

2273. **Gynaecological Causes and Treatment of Sterility.** (Sterilitetens gynekologiske årsaker og behandling.)

By T. DAHLE. *Tidsskr. norske Laegeforen.,* **71**, 383–387 and 389, June 15, 1951. 7 refs.

2274. **Modern Concepts of the Anovulatory Cycle.** By W. STEINBERG. *J. med. Soc. N.J.*, **48**, 326–329, July 1951. 18 refs.

2275. **Bacteriology of the Cervix in Cases of Infertility.**

By C. S. MATTHEWS and C. L. BUXTON. *Fertil. and Steril.*, **2**, 45–52, Jan. 1951. 4 figs., 1 ref.

The authors cultured 100 endocervical specimens, each organism being grown in beef broth. Sperms were added, both in seminal fluid and in Ringer's glucose solution after centrifugation and decantation of the supernatant seminal plasma. The semen was pooled so that the average was 100,000,000 per ml., with 50 to 70 per cent motility, a total of 180 specimens being used; 0.5 ml. of beef broth culture was mixed with 0.5 ml. of semen or equivalent Ringer's solution. This was incubated at 37° C., and the motility and progression was recorded at intervals for 6 hours. Culture was made against *Bacterium coli*, which reduced motility 30 per cent in the first half-hour and also produced sperm agglutination. No other organisms did this. The results were similar for both semen and Ringer's solution.

Other experiments were undertaken with *Bact. coli* and streptomycin, which prolonged the viability. There was no agglutination with heat-killed cultures. Alteration in pH in these experiments did not affect the longevity of the sperm.

The authors confirm the observations of Gunsalus *et al.* (*Dairy Sci.*, 1941, **24**, 911) that there is an increased temporary initial agitation of bull spermatozoa when mixed with haemolytic streptococci, followed quickly by complete sperm mortality. This was proved by the addition of penicillin to the broth. Other tests *in vitro* showed that diphtheroids, streptococci, and staphylococci were innocuous to spermatozoa.

Treatment with the appropriate antibiotics resulted in 7 pregnancies out of 25 (25 per cent); in 13 cases there were improved post-coital tests (52 per cent).

The authors discuss the difficulties of control in the absence of cervical culture at the time of conception. *B. Sandler*

2276. **Diagnosis of Sterility in the Female.** (Diagnostico da esteriladade feminina.)

By R. C. CAVALCANTI. *Rev. pernambuc. Matern. Inf.*, **3**, 231–241, Dec. 1950. 40 refs.

2277. **Analysis of Clinical Data on 500 Childless Couples: Fertility Results.**

By V. H. TURNER, C. D. DAVIS, J. ZANARTU, and E. C. HAMBLEN. *Sth. med. J. Bgham, Ala.*, **44**, 628–638, July 1951. 9 figs., 7 refs.

2278. **Sperm Survival at Estimated Ovulation Time. Comparative Morphology: Relative Male Infertility.**

By M. R. COHEN and I. F. STEIN. *Fertil. and Steril.*, **2**, 20–28, Jan. 1951. 2 figs., 5 refs.

This paper provides a study of the comparative morphology of spermatozoa surviving in cervical mucus, as compared with the ejaculate specimen. Previous findings, which indicated that sperm may survive up to 72 hours in the cervical mucus at ovulation but that in the pre- and post-menstrual phases their survival is poor, are discussed. Motile spermatozoa were recovered from 1 to 58 hours after coitus and were normal in motility and morphology. A remarkable reduction in the percentage of abnormal spermatozoa was noted. The morphology of spermatozoa after coitus was compared with the analysis of the semen previously obtained from that particular individual. The motility up to 58 hours in the cervix showed the sperm to be as active as in the fresh ejaculate. The morphology and quality of the cervical sperm, however, were very much better than in the masturbation specimen. Of 33 marriages where a guarded prognosis had been given because of substandard spermatozoa, conception occurred subsequently in 17.1 per cent.

[These results are at variance with those of Rubenstein *et al.* (see Abstract 2279): the explanation may be the low fertility of the women who were undergoing operation for gynaecological lesions.] *B. Sandler*

2279. **Sperm Survival in Women. Motile Sperm in the Fundus and Tubes of Surgical Cases.**

By B. B. RUBENSTEIN, H. STRAUSS, M. L. LAZARUS, and H. HANKIN. *Fertil. and Steril.*, **2**, 15–19, Jan. 1951. 9 refs.

This investigation is concerned with the duration of sperm survival in the female genital tract. Three volunteers agreed to have the uterus washed out with saline after coitus: in 5 trials spermatozoa were found after 36 hours still motile in the uterus or in the Fallopian tubes, as compared with survival up to 60 hours *in vitro* at room temperature for the same specimens. Owing to the occurrence of endometrial infection in 2 out of the 3 volunteers the experiments were discontinued. The next step was to spray semen on the cervix of patients about to undergo hysterectomy. The cervix, fundus, and tubes were then separated immediately after operation, opened and washed with saline, and a search made for spermatozoa. The results show that spermatozoa reach the tubes within 30 minutes and may survive up to 50 hours. No correlation was attempted with the phases of the menstrual cycle.

[This extremely interesting work needs to be repeated with a larger number of cases to correlate different types of results during ovulatory and during other phases of the menstrual cycle. One important point not mentioned in the report is whether inquiry was made as to the date of the last coitus before the patient was admitted to hospital; this may invalidate results such as the sperm migration within half-an-hour.]

B. Sandler

2280. **The Diagnostic and Therapeutic Possibilities of the Use of Water-soluble Contrast Media for Hysterosalpingography.** (Possibilità diagnostiche e terapeutiche delle soluzioni di contrasto proposte per la isterosalpingografia.)

By E. ROBECCHI. *Minerva ginec.*, **2**, 525–532, Dec. 1950. 10 figs., 26 refs.

2281. **A Variation on Le Lorier's Test for Patency of the Tubes.** (A proposito de una variante en la prueba de permeabilidad tubarica segun Le Lorier.)

By P. DE LA PENA REGIDOR. *Rev. Obstet. Ginec.*, **10**, 257–260, 1950. 5 refs.

2282. **The Aetiology of Retroflexion of the Uterus.** (Zur Aetiologie der Retroflexio uteri.)

By T. ANTOINE. *Wien. klin. Wschr.*, **63**, 74, Feb. 2, 1951.

2283. **Family Planning in the U.S.A.** (Geburtenregelung in U.S.A.)

By K. J. ANSELMINO and R. GROSS. *Dtsch. med. Wschr.*, **76**, 508–511, Apr. 13, 1951. 20 refs.

2284. **The Morgagni-Turner Syndrome.** (Das Morgagni-Turner Syndrom.)

By F. HENI. *Klin. Wschr.*, **29**, 75–80, Feb. 1, 1951. 3 figs., 19 refs.

The author describes 8 cases, in 7 women between 18 and 22 and one of 61 years, in which there were signs of stunted growth, infantile development of the mammary glands, uterus, and vagina, osteoporosis, amenorrhoea, increase in the urinary elimination of gonadotrophins, and various congenital anomalies, such as cubitus valgus, webbing of the neck, and sometimes mental retardation, all connected with ovarian agenesis or hypoplasia. This syndrome is called Turner's or the Turner-Albright syndrome, but should really be called the Morgagni-Turner syndrome. The author quotes Morgagni's original description of the condition in a patient of 66 in 1768. It is pointed out that removal of the gonads (castration) at the age of 2 will lead to eunuchoidism (Cotté), and not usually to the Morgagni-Turner syndrome, which has to be regarded as possibly a genetic entity of its own, always combined with dwarfism. The results of treatment with oestrogen and the differential diagnosis, especially from cases of pituitary dwarfism, are discussed. Finally, it is pointed out that the syndrome is by no means so rare as has been believed in the past.

V. C. Medvei

ANOMALIES OF THE REPRODUCTIVE ORGANS

2285. **Male Pseudohermaphroditism. A Type Showing Habitus, Absence of Uterus, and Male Gonads often Associated with Testicular Tubular Adenoma. Report of Case and Review of Literature.**

By M. WACHSTEIN and A. SCORZA. *Amer. J. clin. Path.*, **21**, 10–23, Jan. 1951. 5 figs., 32 refs.

The authors believe that their case of male pseudo-hermaphroditism in a 20-year-old girl is an example of a definite clinical entity, and have collected 20 similar cases from literature. The hereditary factor was shown by the fact that there were 3 pairs of sisters, and 3 cases with a history of primary amenorrhoea among sisters and aunts. All showed typical female sex characteristics and normal external genitalia, except for lack of pubic and axillary hair. The vagina was short and the uterus absent. In the majority of cases one or both gonads were found in the inguinal canal, and it was usually for the discomfort thus caused that advice was sought.

The histology of the gonads examined was that of immature testicles with marked hyperplasia of Leydig cells and testicular tubular adenoma of most instances. Hormone studies were incomplete, but the urinary excretion of 17-ketosteroids was mostly normal, that of oestrogen lowered, and of gonadotrophin raised. *D. W. Higson*

2286. **Uterus Duplex with Transverse Septum of the Vagina.**

By M. J. WHITELAW. *Amer. J. Obstet. Gynec.*, **62**, 203–205, July 1951. 2 figs., 7 refs.

2287. **Atresia of the Uterus.** (Atresia uteri.)

By K. K. KLEM. *Tidsskr. norske Laegeforen.*, **71**, 172–174, Mar. 15, 1951. 3 refs.

2288. **Congenital Ectopic Ovary.**

By D. H. NICHOLS and A. V. POSTOLOFF. *Amer. J. Obstet. Gynec.*, **62**, 195–198, July 1951. 3 figs., 3 refs.

2289. **A Clinical and Pathological Study of a Case of Uro-genital Malformation.** (Considerazioni cliniche ed anatomopatologiche su di un caso di malformazione urogenitale.)

By F. TOSCANO and L. CUSMANO. *Minerva ginec.*, **2**, 537–544, Dec. 1950. 12 figs., 19 refs.

INFECTIONS OF THE REPRODUCTIVE ORGANS

2290. **The Use of Aureomycin in Obstetrics and Gynaecology.**

By H. C. HESSELTINE and H. D. PRIDDLE. *Amer. J. Obstet. Gynec.*, **62**, 173–176, July 1951. 7 refs.

2291. **The Blood-peritoneum Barrier Against Sulphonamides and Antibiotics.** (Zur Blutperitonealschranke für Sulfonamide und Antibiotika.)

By H. E. RUETHER. *Zbl. Gynäk.*, **73**, 1130–1138, 1951.

2292. **Morphological Findings after Local Application of Sulphonamides in Gynaecology.** (Ueber morphologische Befunde nach lokaler Sulfonamidapplikation in der Gynäkologie.)

By H. WAGNER. *Med. Welt.*, **20**, 596–598, May 5, 1951. 6 figs.

2293. **Experiences with the Sulphonamide "Aristamid."** (Erfahrungen mit dem Sulfonamid Aristamid.)

By P. SIEGEL. *Zbl. Gynäk.*, **73**, 789–801, 1951.

2294. **The Role of Anaerobic Bacteria in Gynaecological Disease.** (Die Bedeutung der Anaerobenbakteriologie bei gynäkologischen Erkrankungen.)

By G. WILLICH and W. MUELLER. *Z. Hyg. InfektKr.*, **132**, 339–346, 1951. 14 refs.

2295. **"Adnexol" in the Treatment of Intra-abdominal Inflammation in the Female.** (Adnexol in der Behandlung der Unterleibsentzündungen der Frau.)

By K. E. FECHT. *Med. Welt*, **20**, 898, July 14, 1951.

2296. **Aerosols in Gynaecology.** (Les aérosols sont entrés au service de la gynécologie.)

By L. GROLLET. *Brux.-méd.*, **31**, 1486–1492, July 15, 1951.

2297. **Salpingitis and Pelvic Suppuration.** (Salpingoovarites et suppurations pelviennes.)

By G. ROUHIER. *Sem. Hôp. Paris*, **27**, 303–314, Jan. 26, 1951. 1 ref.

The author reviews the history of the diagnosis and treatment of pelvic inflammatory lesions. Four aetiological factors are considered: gonococcal, streptococcal, and tuberculous infections, which together account for the great majority of cases, and rather rare infections of intestinal origin.

The importance of preventive treatment is stressed. In the acute stage the author recommends abdominal applications of ice, warm douches, penicillin, sulphonamides, and "propidon" (acting as a vaccine or protein shock therapy). In rare instances, when lesions are massive and irreversible or when an acute lesion is refractory to conservative measures, surgical treatment has to be considered. In cases of abscess of the pouch of Douglas, colpotomy is indicated as a temporary measure. Local injections of penicillin into the parametrium and the base of the broad ligament have been used with surprisingly good results. The most difficult part of the operation is the separation of the adnexa, which often has to be preceded by hysterectomy or hemisection of the uterus.

The author considers the drainage by Mikulicz's method of first importance. The drain consists of a sac of gauze lightly packed with pieces of gauze, which are usually removed on the 4th day; the sac is removed on the 7th day. As a routine, the author performs a subtotal hysterectomy. Should the leucorrhoea persist, the cervix is removed later per vaginam, a safe and easy procedure according to the author. There should be no attempt made to conserve infected ovaries, as they remain painful, become polycystic, and will have to be removed later. The surgical treatment of tuberculous salpingitis is more difficult because of the greater amount of adhesion and the invasion of the intestines by the fibrocaseous masses. Systemic and local injections of streptomycin give promising results. *G. J. Arendt*

2298. **A Series of Five Successfully Treated cases of *Perfringens* Septicaemia.** (Cinq cas de septimémie a *Perfringens* gueris en série.)

By L. DIGONNET, J. LE GOFF, J. DAFFOS, and J. CAHN. *Gynéc. et Obstét.*, **50**, 159–171, 1951. 5 figs.

2299. **Ulceration of the Portio Caused by *Bacillus funduliformis*.** (Portio-Ulzerationen durch *Bacillus funduliformis*.)

By H. HARTL. *Zbl. Gynäk.*, **73**, 1051–1055, 1951. 16 refs.

2300. **The Local Application of Oestrogens in the Treatment of Non-specific Vaginitis.** (Applicação intravaginal de estrogênios no tratamento do fluxo vaginal inespecífico.)

By A. UCRÓS CUELLAR. *An. brasil. Ginec.*, **16**, 82–86, Feb. 1951. 30 refs.

2301. **Treatment of Trichomonas Vaginalis Vaginitis. II. Factors Affecting Response to Treatment.**

By W. J. REICH, H. L. BUTTON, and M. J. NECHTOW. *J. int. Coll. Surg.*, **16**, 86–92, July 1951. 7 refs.

2302. **Occupational Vulvovaginitis.** (Vulvo-vaginiti "professionali").

By F. FRANCHI. *Difesa soc.*, **30**, 16–17, Jan.-Mar. 1951.

2303. **Moniliasis of the Female Genital Tract. (Etiological and Experimental Observations.)**

By Y. M. BROMBERG, A. BRZEZINSKI, and F. RAUBITSCHEK. *Exp. Med. Surg.*, **9**, 79–89, Feb. 1951. 16 refs.

This study was undertaken in Jerusalem to determine the percentage of fungus infections in inflammatory diseases of the genital tract and to investigate the factors influencing the clinical symptoms in such infections. *Candida albicans* was found in 4.3 per cent of 115 non-pregnant women and 10 per cent of 79 pregnant women having no symptoms of vaginal or vulval inflammation. In patients suffering from vulval or vaginal inflammation the same fungus was found in 8 per cent of 299 non-pregnant women and 34 per cent of 40 pregnant women. The pathogenic fungus is therefore liable to be present without causing clinical manifestations, and both in these cases and in patients suffering from vulvo-vaginitis it is considerably more frequent during pregnancy.

Of the 36 cases of vulvo-vaginitis, deficiencies of riboflavin and nicotinic acid, sometimes combined with vitamin-A deficiency, were found in 9. It was found that 25 patients came from the poorest

population of Jerusalem and were living under the worst possible hygienic conditions. There were 29 cases during the summer season when cultures were more frequent. In 9 of the 36 cases local changes such as cervical tears and prolapse were present. Diabetes was found in 5 cases.

A number of attempts were made to precipitate vulvo-vaginitis in healthy carriers by the administration of sex hormones and by the installation of glucose into the vagina, but without success. In 2 out of 3 cases, however, where a foreign body (pessary) was introduced for a month, a characteristic discharge appeared. Eight patients suffering from skin fungus infections were examined and in none was fungus found in the vagina, but in a further case an associated rectal inflammation appeared to be giving rise to constant vaginal reinfection. No evidence of fungus infection was found in the genital organs of the husbands of the affected patients.

J. A. Chalmers

2304. **Vaginal Thrush.** (Trøske i vagina.)
By H. SUNDFOR. *Tidsskr. norske Laegeforen.*, **71**, 288–389, June 15, 1951. 4 refs.

2305. **Chemotherapy in Non-specific Cervicitis.** (Chemotherapie des unspezifischen Fluor vaginalis.)
By W. NIEHUSMANN and L. WIGGER. *Med. Welt*, **20**, 897–898, July 14, 1951.

2306. **Peritonitis due to Rupture of an Acute Pyosalpinx.** (Peritonitis door ruptuur van een acute pyosalpinx.)
By M. M. MADLENER. *Ned. Tijdschr. Geneesk.*, **95**, 1616–1621, June 2, 1951. 11 refs.

2307. **Genital Tuberculosis.** (Tuberculosis genital.)
By F. RICO. *Toko-ginec. pract.*, **10**, 169–173, Mar. 1951.

2308. **Adeno-chancroid of the Uterus.** (Sull'adenocancroide dell'utero.)
By P. BERTOLETTI. *Minerva ginec.*, **2**, 548–552, Dec. 1950. 2 figs.

NEW GROWTHS OF THE REPRODUCTIVE ORGANS

2309. **Results of an Experiment in the Control of Pelvic Cancer.**
By C. MACFARLANE, M. C. STURGIS, and F. S. FETTERMAN. *Amer. J. Obstet. Gynec.*, **62**, 102–108, July 1951.

2310. **Treatment of Advanced Pelvic Cancer.** (Tratamento do câncér pélvico avançado.)
By H. CARRAPATOSO. *Rev. Brasil. Cir.*, **20**, 1211–1226, Dec. 1950. 10 figs., 17 refs.

2311. **Clinical Experience of the Combined Use of Penicillin and Sulphonamides in Gynaecological Carcinomata.** (Klinischer Erfahrungsbericht über die Verwendung der Penicillin-Sulfonamid-Kombination bei gynäkologischen Carcinomen.)
By F. HAUSS. *Med. Klinik.*, **46**, 447–449, Apr. 6, 1951. 35 refs.

2312. **Relation of Hormones to Female Genital Cancer.**
By E. NOVAK. *Amer. J. Surg.*, **82**, 149–151, July 1951. 1 ref.

2313. **The Late Complications Following Irradiation of Pelvic Viscera.**
By W. C. WHITE and F. W. FINN. *Amer. J. Obstet. Gynec.*, **62**, 65–74, July 1951 6 figs., 14 refs.

2314. **Lumbar Pain in Pelvic Tumours and Cancer of the Female Genitalia.** (La lumbalgia en los tumores de la pequeña pelvis y en el cáncer ginecológico.)
By V. CONILL MONTOBBIO. *Acta méd. hisp.*, **8**, 85–95, Mar.-Apr. 1950.

2315. **Extragenital Tumours in the Pelvis.** (Extragenitale Tumoren im kleinen Becken.)
By G. LANGENDÖRFER. *Zbl. Gynäk.*, **73**, 763–766, 1951. 5 refs.

2316. **Adequate Diagnosis of Vulval Lesions.**
By J. R. SOSNOWSKI. *S. Carolina med. Ass.*, **47**, 135–237, July 1951. 7 refs.

2317. **Myoblastoma of the Labium Majus. Report of a Case.**
By S. IRGANG and R. ULTMANN. *Harlem Hosp. Bull.*, **4**, 31–34, June 1951. 9 refs.

2318. **Fibrosarcoma of Labium Vulvae.**
By J. KELLER. *Canad. med. Ass. J.*, **64**, 534–536, June 1951. 1 fig., 26 refs.

2319. **Carcinoma of the Vulva in a Young Woman.**
By A. F. LASH and M. ZIBEL. *Amer. J. Obstet. Gynec.*, **62**, 216–217, July 1951. 6 refs.

2320. **Treatment of Carcinoma of the Vulva.** (Tratamiento del cáncer de la vulva.)
By E. SCHAFFNER. *Obstet. Ginec. lat.-amer.*, **9**, 99–105, Mar.-Apr. 1951.

2321. **Relation of Leucoplakic Vulvitis to Squamous Carcinoma of the Vulva.**
By I. I. LANGLEY, A. T. HERTIG, and G. V. S. SMITH. *Amer. J. Obstet. Gynec.*, **62**, 167–169, July 1951. 11 refs.

2322. **Precancerous Conditions of the Portio.** (Praecancroser på portio.)
By O. PETERSEN. *Ugeskr. Læg.*, **113**, 697–703, May 31, 1951. 8 figs., 28 refs.

2323. **Radiation Therapy of Carcinoma of the Vagina.**
By F. BUSCHKE and S. T. CANTRIL. *Radiology*, **56**, 193–201, Feb. 1951. 10 figs., 7 refs.

Attention is drawn to the prevalent opinion that vaginal carcinoma is rare and difficult to treat, but figures are quoted from the *Institut du Radium* and the authors' own Institute in the Swedish Hospital, Seattle, showing that a good proportion

of patients are well 3 years after treatment—16 of 31 and 6 out of 10 in the two series treated. A method of staging is proposed and details of the methods of treatment are given. Two of the patients who remained well had had hysterectomy many years before, and 2 had lesions on the posterior wall, one high up the left lateral wall, and the other in the right fornix. All who died had lesions on the anterior wall, 2 spreading round to the posterior wall. All were treated with radium and X-rays, the latter in 8 cases at 800 kV and in 2 at 200 kV. Success is thought to be due to adequate treatment of the lymph drainage area by the X-ray therapy. Way (*J. Obstet. Gynec.*, 1948, **55**, 739) is quoted to show that the patients who survived for long periods were those with lesions in the upper third of the vagina, where a fairly standard radium application is possible. Low lesions failed to heal. Difficulties are overcome by carefully planned external X-ray therapy of the whole vagina followed by suitable radium therapy of the remaining central portion of the tumour. The method is illustrated by diagrams showing the position of the tumour in each case. [Although it is claimed that the use of very high voltage is not essential, it is obvious that the availability of 800 kV must have facilitated the delivery of the required dose to lesions situated within the pelvic outlet.]

M. C. Tod

2324. **Sarcoma of the Vagina and Preinvasive Carcinoma of the Cervix.** (Sarkom der Scheide und präinvasives Karzinom der Cervix.)

By G. HALTER. *Wien. Med. Wschr.*, **101**, 438–440, June 16–23, 1951. 3 figs., 18 refs.

2325. **Malignant Lesions of the Uterus associated with Estrogen-producing Ovarian Tumours.**

By M. B. DOCKERTY and E. MUSSEY. *Amer. J. Obstet. Gynec.*, **61**, 147–153, Jan. 1951. 2 figs., 19 refs.

The coexistence of uterine carcinoma and feminizing ovarian tumours has been noted on several occasions. In a study of 87 granulosa-cell and theca-cell tumours, the authors have noted the occurrence of uterine cancer 15 times, and no less than 3 of these patients have mammary cancer as well. The over-all incidence of the association of uterine with ovarian lesions was more than 15 per cent. Uterine cancer did not, however, complicate granulosa-cell and theca-cell tumours of younger women, such cases being mainly in women over 50.

In the present paper reports are given of the cases in which feminizing ovarian tumours were associated with the presence of uterine cancer. The association was much more frequent than could be explained on the basis of chance alone. Carcinogenic influence of oestrogen is suggested as a possible cause.

F. J. Browne

2326. **Variations in the Structure of the Myometrium and Tumours arising from it in Relation to Age and Ovarian Function.** (Die Verschiedenheit des Aufbaues des Myometrium uteri und seiner geschwultigen Derivate in Abhänggigkeit vom Alter und von der ovariellen Funktion.)

By H. REITTER. *Virchows Arch.*, **319**, 555–557, 1951. 18 figs., 18 refs.

2327. **Uterine Fibromyoma.** (Fibromyoma uteri.)

By H. DUPONT. *Nord. Med.*, **45**, 1002–1006, June 27, 1951.

2328. **A Contribution to the Study of Complications in Cases of Fibroids.** (Contribution a l'étude des complications dans les cas de myomes.)

By S. H. CANGA. *Acta med. turc.*, **3**, 65–76, June 1951. 6 figs., 2 refs.

2329. **The Structure of Uterine Septa in Relation to the Histogenesis of Fibroids.** (Die Struktur der Uterussepten, zugleich als Beispiel für die Histogenese von Myomen.)

By G. HÖRMANN. *Virchows Arch.*, **320**, 43–57, 1951. 7 figs., 29 refs.

2330. **Contribution to the Study of the Oestrogenic Aetiology of Uterine Fibroids.** (Contribuição para o estudo da etiologia estrogenica do miofibroma uterino.)

By A. P. DELLIVENNERI. *Arch. Cirug. clin. exp.*, **13**, 365–366, Sept.-Oct. 1951.

2331. **The Conservative Treatment of Uterine Fibroids.** (La conducta conservadora en el mioma uterino.)

By C. D. GUERRERO. *Ginec. Obstet. Méx.*, **6**, 43–64, Jan.-Feb. 1951. 13 figs., bibliography.

2332. **An Unusual Case of Cholesterol and Lipochrome Infiltration of a Uterine Fibroid.** (Rara infiltrazione colesterino-lipocromica in un fibromioma uterino.)

By G. CANDIANI and E. NARDELLI. *Riv. Anat. patol.*, **4**, 241–258, Mar. 1951. 4 figs., 38 refs.

2333. **Calcified Myoma.** (Mioma calcificado.)

By H. R. REALE and D. MEZZADRI. *Sem. méd. B.Aires*, **58**, 577–585, Apr. 19, 1951. 4 figs., 33 refs.

2334. **Leiomyosarcoma of the Uterus following Radiation for Hemorrhage from Submucous Fibromyoma.**

By I. SMILEY and J. W. TANDATNICK. *N.Y. St. J. Med.*, **51**, 1504–1510, June 15, 1951. 4 figs., 9 refs.

2335. **Co-existent Sarcoma and Carcinoma of the Uterus. A Case Report.**

By G. A. CROCE and E. MEYER. *Rhode Island med. J.*, **34**, 316–318, June 1951. 4 figs., 8 refs.

2336. **Carcinosarcoma of the Uterus.** (Carcinosarcoma uterino.)

By J. C. AHUMADA, R. SAMMARTINO, and L. A ARRIGHI. *Obstet. Ginec. lat.-amer.*, **9**, 131–148, May 1951. 6 figs., bibliography.

2337. **Sarcomata of the Endometrium.** (Contributo alla conoscenza dei sarcomi dell'endometrio.)
By G. REBAUDI. *Ann. Ostet. Ginec.*, **73**, 157–179, Jan. 1951. 9 figs., 34 refs.

2338. **Secondary Carcinomatous Deposits in the Uterus; Diagnosis by Curettage and Excision.** (Ueber sekundäre Karzinose des Uterus und ihre Diagnose aus dem Probekürattement und der Portioexzision.)
By I. OBIDITSCH-MAYER. *Zbl. Gynäk.*, **73**, 1142–1148, 1951. 2 figs., 12 refs.

2339. **The Early Diagnosis of Chorionepithelioma.** (Diagnostica precoce del corionepitelioma.)
By G. MOTTA. *Minerva ginec.*, **3**, 211–224, May 1951. Bibliography.

2340. **Mesonephric Cyst of the Cervix.**
By H. E. VELDMAN. *Amer. J. Obstet. Gynec.*, **62**, 214–215, July 1951.

2341. **Prophylaxis of Cancer of the Prostate, Penis, and Cervix by Circumcision.**
By A. RAVICH and R. A. RAVICH. *N.Y. St. J. Med.*, **51**, 1519–1520, June 15, 1951. 15 refs.

2342. **Carcinoma of the Cervix in Jewish Women.**
By A. ROTHMAN, L. P. RAPOPORT, and I. DAVIDSON. *Amer. J. Obstet. Gynec.*, **62**, 163–166, July 1951. 3 figs., 5 refs.

2343. **The Relationship of the Enzyme beta-Glucuronidase to Cancer of the Cervix Uteri.**
By W. H. FISHERMAN. *Bull. New Engl. med. Center*, **13**, 12–18, Feb. 1951. 2 figs., 12 refs.

Earlier work had shown that human cancer tissue, in a majority of the cases studied, was richer in β-glucuronidase than surrounding tissues; normal uterine cervix contained an average of 153 units per g. of tissue, while the malignant cervix contained 1,647 units per g. Odell (*Cancer Res.*, 1949, **8**, 362) suggested that the β-glucuronidase assay of vaginal fluid could be used for screening the female population for cervical cancer, since this fluid contained more than 300 units per ml. of the enzyme in all tested cases of this form of cancer. False positive results in 20 per cent were attributed to states of pregnancy and to *Trichomonas vaginalis* infection.

The present work was undertaken to evaluate the claims of Odell. Vaginal fluid was weighed, treated with acetate buffer (0.1 M, pH 4.5), and the glucuronidase activity measured. A control study of 500 non-pregnant healthy women showed that glucuronidase activity ranged from 0 to 4,500 units per g. of tissue; 65.3 per cent showed a value below 300 units. When the results were analyzed by age, the older and post-menopausal women mainly showed values greater than 300 units.

A series of 31 women with untreated cervical cancer and 32 who had been treated was studied. In the former group women below 40 years of age and also those of 41 to 60 years, if pre-menopausal, showed a greater glucuronidase activity than the corresponding controls. But post-menopausal members of this group showed values not significantly different from those in a comparable group of healthy women. The range of values was from 100 to 2,000 units per g. of tissue, which is lower than the range observed in the controls. Values below 300 units were found in 74 per cent of women who had undergone hysterectomy leaving a cervical stump, and 57 per cent who had undergone panhysterectomy. Administration of stilboestrol and then progesterone after panhysterectomy and removal of ovaries caused an immediate fall to low values, suggesting that endocrine factors played a dominant role in controlling the level of glucuronidase in vaginal fluid. The factors of pregnancy, *Trichomonas* infestation, and leucocyte populations were found to be of minor importance in influencing glucuronidase activity.

The total results do not support the suggestion of Odell that a 300-unit level may form a basis for the diagnosis of cervical cancer, though further investigation may provide a limited selection test for cases where this type of cancer is suspected.

In contrast to Odell, the author found an increased glucuronidase activity after irradiation.
H. G. Crabtree

2344. **Endocrine Factors in Cancer of the Cervix Uteri.**
By H. E. NIEBURGS. *Amer. J. Obstet. Gynec.*, **62**, 93–101, July 1951. 4 figs., 28 refs.

2345. **Early Cervical Carcinoma, with Special Reference to Isolated Intracervical Leucoplasia.** (Ueber das Frühkarzinom der Portio unter besonderer Berücksichtigung der isolierten intrazervikalen Leukoplakie.)
By H. G. GOLDAMMER. *Zbl. Gynäk.*, **73**, 1148–1152, 1951. 5 figs.

2346. **Certain Aspects of the Early Diagnosis of Cancer of the Cervix.** (Aspetti della diagnosi precoce del cancro del collo dell'utero.)
By R. KELLER. *Minerva ginec.*, **3**, 195–199, May 1951. 11 refs.

2347. **Colposcopic Diagnosis of Atypical Epithelium at the Cervix, with Reference to American Methods.** (Die kolposkopische Diagnose des atypischen Epithels am Muttermund unter Berücksichtigung der amerikanischen Methoden.)
By H. HINSELMANN. *Dtsch. med. Wschr.*, **76**, 512–513, Apr. 13, 1951.

2348. **A Simplified Silver Impregnation Method for Vaginal Smears.**
By G. M. RILEY, S. J. BEHRMAN, and D. DE VORE. *Science*, **113**, 574–576, May 18, 1951. 1 fig., 5 refs.

2349. **The Value of "Complementary" Hysterectomy in the Treatment of Cancer of the Cervix in Stage I.** (La valeur de l'hystérectomie "complémentaire" dans le traitement du cancer du col utérin au stade I.)

By H. REDON and S. LABORDE. *Mém. Acad. Chir., Paris*, **76**, 909–919, Nov. 19, 1950. 1 ref.

With the object of investigating the action of radium therapy in Stage-I cancer of the cervix, the authors performed abdominal hysterectomy and examined the histology of tissues removed from the pelvis in 34 cases at the Institut Gustave-Roussy during 1948 and 1949. It is claimed that hysterectomy allows better appreciation of the action of radium and, to a certain degree, the measure of success or failure of the method of application.

Monod found that in 75 cases, mostly of Stage II, 25 per cent had cancerous lesions persisting, while Leger and Levrand reported that in the same percentage of 16 cases treatment had been "insufficient", and finally Brenier described 41 cases with a failure rate of 34 per cent; this last concludes that it is necessary to perform hysterectomy following the radiotherapy.

Since these figures depend on histological reports after the laparotomy following radiotherapy, the authors stress the importance of the time elapsing between the radium treatment and the operation and of the method used to apply the radium. At the Institut Gustave-Roussy the time interval was 2 to 2½ months after the application of 2 or 3 intrauterine tubes and 3 tubes of 10 mg. around the cervix, so as to ensure a total dosage of 60 to 70 millicuries destroyed (m.c.d.). The uterine arteries were ligated and cut above the crossing of the ureters, which were dissected up to the base of the broad ligament, and a 2- to 3-cm. collar of vagina was excised, together with the peri-cervical and peri-vaginal connective tissue. No attempt was made to excise all the lymph nodes, and indeed no palpable nodes were found during the operations. In each case 8 to 10 pieces of tissue were removed from various areas and numerous sections were cut from each block.

The high rate of failure recorded by previous investigators is attributed to the omission in some cases of the vaginal application and to the laparotomy having been done too soon. The dosage, in some cases where the method of application seemed satisfactory, was insufficient (46.5 m.c.d.). The cases at the Institut Gustave-Roussy were successfully treated in almost every instance. Only 3 patients provided histological evidence which was inconclusive. In certain sections discrete strands showed the formation of glandular epithelium, more or less undifferentiated and of diminished vitality: there were some abnormal forms, none of which, however, revealed conclusive signs of malignancy. These patients had been operated upon for one reason or another earlier than the advised period of 2 to 2½ months. In 2 other cases, operated upon at the determined period, some suspect cells showing diminished vitality were found, but different histologists consulted gave varying interpretations of the sections. These 2 cases could be classified neither as successes nor as failures.

The effect of radium on the squamous epithelioma and on columnar-celled carcinoma is discussed. The sensitivity of the former is generally recognized, and the authors incline to the conviction that the endocervical cylindrical epitheliomata are "very nearly" as sensitive.

All the patients operated upon made a satisfactory recovery from the operation. *E. W. Kirk*

2350. **Carcinoma of the Cervix: Diagnostic and Therapeutic Considerations.** (Carcinoma do colo do útero.)

By N. DE ATHAYDE RIBEIRO. *Rev. brasil. Cir.*, **20**, 1227–1238, Dec. 1950. 19 refs.

2351. **The Significance of Some Secondary Factors in the Cure of Carcinoma of the Cervix.** (Die Bedeutung einiger Nebenfaktoren für die Heilung des Collum-Karzinoms.)

By H. RUNGE and H. WIMHÖFER. *Dtsch. med. Wschr.*, **76**, 501–504, Apr. 13, 1951.

2352. **Primary Carcinoma of the Stomach with Metastasis to the Cervix.**

By L. REIDENBERG. *Amer. J. Obstet. Gynec.*, **62**, 209–211, July 1951.

2353. **Carcinoma of the Cervical Stump.**

By H. C. HEINS and H. R. PRATT-THOMAS. *J. S. Carolina med. Ass.*, **47**, 192–195, June 1951. 17 refs.

2354. **Arrhenoblastoma. The Incidence of Malignancy and the Relationship to Pregnancy, to Sterility, and to Treatment.**

By C. T. JAVERT and W. F. FINN. *Cancer*, **4**, 60–77, Jan. 1951. 14 figs., bibliography.

The authors, working in the Department of Obstetrics and Gynecology of Cornell University Medical College and the Women's Clinic of the New York Hospital, have analyzed some 122 cases of arrhenoblastoma, including 3 personal cases which are described and illustrated in detail. Of the 119 cases from the literature, details of 73 were taken direct from the original publication, and of 46 by means of a questionary sent to 50 authors who had reported cases.

The analysis of these 122 cases revealed 27 cases of malignant arrhenoblastomata (22 per cent). When the histological appearance of the tumour, regardless of recurrence or fatal outcome, was used as a criterion of malignancy, another 5 cases could be added (26 per cent). One new case of malignant arrhenoblastoma is described.

In the whole series pregnancy occurred in 38 of the cases before the appearance of the tumour, 5 at the time of the tumour's appearance, and 25 after removal of the tumour. The authors state

that the " opportunities for pregnancy before the development of arrhenoblastoma are virtually the same as for normal women if there are no associated congenital malformations. The simultaneous occurrence of arrhenoblastoma and pregnancy is very rare because of the associated amenorrhoea defeminization and virilization."

Regarding treatment, exploratory laparotomy is recommended when clinical and surgical evidence of malignant extension, ascites, or rapid growth is present. Total hysterectomy and bilateral salpingo-oöphorectomy are performed if possible, and if not, multiple biopsies are carried out. Conservative unilateral oöphorectomy should be reserved for apparently unilateral tumours in young women with normal genital organs in order that pregnancy may occur. If subsequent microscopical examination reveals an anaplastic type of arrhenoblastoma, the remaining pelvic organs should be removed; the patient should be followed up and ketosteroids should be determined in order to detect recurrence. Three supposedly benign tumours out of the total of 95 cases in the literature are known to have recurred. *Donald Beaton*

2355. **A Case of Masculinovoblastoma.**

By W. H. H. MERIVALE and L. FORMAN. *Brit. med. J.*, **1**, 560–563, Mar. 17, 1951. 5 figs., 30 refs.

An unmarried woman aged 62 had the menarche at 16, but her menses ceased at 30. From then on she gradually lost the hair on her head, and hair grew strongly on her chest, abdomen, and back. She became physically stronger, her face became erythrocyanotic, and her breasts decreased in size. When she was 57 years of age her abdomen had begun to swell. The blood pressure in the arms and legs was 140/90 mm. Hg. The pubic hair had a masculine distribution, the clitoris was enlarged, and the voice deep and husky. Laboratory investigations revealed mild polycythaemia and mild impairment of renal function. Radiological examination showed a pituitary fossa of normal size. A right ovarian tumour 3.8 cm. in diameter was removed. The tumour had a brown cut surface with scattered areas of yellow. Histologically, it consisted of cells which resembled adrenal cortical tissue. It was therefore termed a masculinovoblastoma.

Very valuable hormone estimations were made. The daily excretion of neutral 17-ketosteroids before operation was 31.18 mg., 6 weeks after operation 2.4 mg., and 8 months after 5.6 mg. The amount of 3-(β)-hydroxy-17-ketosteroids was not increased either abso'utely or relatively to the α-fraction. Excretion of 11-oxycorticoids was normal. She was excreting a small amount of pregnanediol (5.12 mg. of the glucuronide), but more than would be expected from a normal woman of her age. Six weeks after removal of the tumour the pregnanediol excretion fell to 1.025 mg. daily.

F. A. Langley

2356. **Clinical Pathology of Invasive Tumours of the Ovary.** (Clino-patología de los tumores vegetantes del ovario.)

By G. ZENTENO. *Ginec. Obstet. Méx.*, **5**, 429–445, Nov.-Dec. 1950. 12 figs., 17 refs.

2357. **Ovarian Neoplasms with Hormonal Activity.** (Neoplasias del ovario con actividad hormonal.)

By C. ZUCKERMANN. *Ginec. Obstet. Méx.*, **6**, 25–42, Jan.-Feb. 1951. 10 figs., bibliography.

2358. **Ovarian Cyst Contents as a Source of Virus Inhibitor: Histological, Chemical and Rheological Studies.**

By E. L. FRENCH, G. S. GUNTER, and R. MOTTERAM. *Aust. J. exp. Biol. med. Sci.*, **29**, 23–34, Jan. 1951. 23 refs.

2359. **A Case of Malignant Papilloma of the Ovary.** (Sobre un caso de papiloma maligno del ovario.)

By J. Z. RAMOS. *Rev. Obstet. Ginec.*, **10**, 303–305, 1950.

2360. **Malignant Thecoma of the Ovary.**

By F. E. PROCTOR, J. P. GREELEY, and T. K. RATHMELL. *Amer. J. Obstet. Gynec.*, **62**, 185–191, July 1951. 8 figs., 9 refs.

2361. **The Clinical Behaviour of Granulosa-Cell Tumor of the Ovary.**

By W. G. FRENCH. *Amer. J. Obstet. Gynec.*, **62**, 75–83, July 1951. 4 figs., 35 refs.

2362. **The Histology of Ovarian Tumours—Granulosa-Cell Tumours.** (Studio istologico sui tumori ovarici i tumori della granulosa.)

By L. COBELLIS. *Riv. Anat. patol.*, **4**, 359–370, Mar. 1951. 4 figs., 11 refs.

2363. **Krukenberg's Syndrome.** (Le syndrome de Krukenberg.)

By E. DELANNOY, M. VERHAEGHE, and P. GAUTIER. *Rev. franç. Gynéc.*, **46**, 57–68, Mar.-Apr. 1951. 14 refs.

2364. **Multiple Primary Carcinomata of the Large Intestine and Krukenberg's Tumour.** (Carcinomas múltiplos primários do intestino grosso e tumor de Krukenberg.)

By A. G. MÓNICA and A. E. MENDES FERREIRA. *Gaz. méd. portug.*, **4**, 265–273, 1951. 8 figs., 23 refs.

2365. **Ovarian Dysgerminoma.** (Dysgerminoma ovarii.)

By P. AHNFELT. *Nord. Med.*, **45**, 1006–1008, June 27, 1951. 17 refs.

2366. **Meigs's Syndrome—the Evolution of the Original Concept. Remarks on a Malignant Form.** (Síndroma de Meigs. Evolução do seu primitivo conceito algumas considerações sobre a forma maligna.)

By F. FRAZAO. *Gaz. méd. portug.*, **4**, 336–220, 1951. 5 figs., 12 refs.

2367. **Meigs' Syndrome. A Case Report.**
By H. C. STEARNS. *West. J. Surg. Obstet. Gynec.*, **59**, 253–256, June 1951. 3 figs., 9 refs.

2368. **Meigs's Syndrome.** (Meigs' syndrom.)
By V. PETERSEN. *Ugeskr. Læg.*, **113**, 675–677, May 24, 1951. 9 refs.

2369. **Diagnosis and Treatment of Endometrial Carcinoma.** (Carcinoma del endometrio.)
By N. ARENAS. *Obstet. Ginec. lat.-amer.*, **9**, 1–28, Jan.-Feb. 1951. 6 figs., bibliography.

The main points made in this review of the clinical features and treatment of cancer of the endometrium are as follows:

Carcinoma of the endometrium is a disease of the post-menopausal woman, most patients being between 50 and 65 years of age. Successful treatment, as in all malignant disease, depends on early diagnosis. Periodic examination of every woman over the age of 35 is recommended, with the idea of diagnosing this type of cancer in the pre-symptomatic phase. The cancer may evolve silently over a long period; the occurrence of post-menopausal bleeding demands thorough investigation; the presence of a coloured vaginal discharge, without frank bleeding, is an equally suggestive symptom in the post-menopausal woman.

Diagnosis depends on the clinical features, on the cytology of the vaginal secretion, and on diagnostic curettage. Hysterography is useful in the diagnosis of early cases and in determining the area where curettage should be practised. Diagnostic curettage is the most certain method of diagnosis, though the histological features are often difficult to interpret.

The classification is also difficult. The author has adopted that of Schmitz. In this classification cases are divided into 4 stages, ranging from the earliest, where the carcinoma is limited to a small nodule, to cases where the whole uterus is filled with cancer. The prognosis is more favourable than in cancer of the cervix, because the tumour remains localized longer and grows more slowly.

The choice of treatment lies between surgery, radiotherapy, and a combination of these methods. The author prefers total abdominal hysterectomy with removal of the appendages. Treatment with radium has been claimed to give as good results as those of surgery. It is suggested that women treated with radium should be subjected to curettage 1 or 2 months after the completion of treatment. If residual cancer is found, total hysterectomy should be performed. However, it is now claimed that by preliminary treatment with radium, followed by hysterectomy, the 5-year survival rate can be improved from about 60 per cent for radium alone or surgery alone to 80 per cent for the combination of the two. Surgery, or the combination of radium and surgery, should be reserved for earlier cases; radium treatment, with or without X-ray treatment is indicated in inoperable cases.

Josephine Barnes

2370. **Carcinoma of the Endometrium.** [In English].
By L. PARSONS. *Bol. Asoc. méd. P. Rico*, **43**, 276–284, May 1951.

2371. **A Clinicopathological Classification of Endometrial Carcinoma Based on Physical Findings, Anatomical Extent, and Histological Grade.**
By W. F. FINN. *Amer. J. Obstet. Gynec.*, **62**, 1–14, July 1951. 4 figs., 26 refs.

2372. **Squamous-epithelium Formation in the Fallopian Tube.** (Ueber Plattenepithelbildungen in der Tube.)
By H. HUBER. *Zbl. Gynäk.*, **73**, 742–752, 1951. 13 figs., 26 refs.

2373. **Teratoid Tumour of the Left Tube with Eversion and Mucosal Oedema Resembling Elephantiasis.** (Teratoide Geschwülste der linken Tube mit Eversion und elephantiastischem Schleimhautödem.)
By F. LEICHER. *Zbl. Gynäk.*, **73**, 752–760, 1951. 2 figs., 7 refs.

2374. **Aetiology of Endometriosis.** (Etiologia da endometriose.)
By L. M. MACHADO. *Rev. Ginec. Obstet.*, **45**, 42–46, Jan. 1951.

2375. **The Infrequency of Pelvic Endometriosis in Negro Women.**
By G. BLINICK and V. J. MERENDINO. *Amer. J. Surg.*, **81**, 635–636, June 1951. 1 fig., 13 refs.

2376. **Endometriosis.** (Endometrosis.)
By N. ARENAS and A. FOIX. *Rev. Ginec. Obstet.*, **45**, 4–8, Jan. 1951. 1 fig.

2377. **The Treatment of Endometriosis.**
By D. D. WALLACE. *Sth. med. J.*, **44**, 534–537, June 1951. 3 refs.

2378. **Angiomatous Sarcoma of the Intraligamentary Space.** (Ueber ein "angiomatöses" Sarkom des intraligamentären Raumes.)
By H. H. RETSCH. *Zbl. Gynäk.*, **73**, 1181–1185, 1951. 2 figs., 14 refs.

OPERATIONS

2379. **Preparation, Choice of Anaesthetic, and After-care in Gynaecological Operations.** (Vorbehandlung, Narkoseauswahl und Nachbehandlung bei gynäkologischen Operationen.)
By A. BAUNACH. *Med. Welt*, **20**, 468–471, Apr. 7, 1951. 23 refs.

2380. **The Pre-operative Veritol Test of Rehn in Gynaecology.** (La prova preoperatoria di Rehn con il veritol in ginecologia.)
By V. CAMPANILE. *Minerva ginec.*, **3**, 116–121, Mar. 1951. 31 refs.

2381. **Prophylactic Psychotherapy before Desexualizing Operations.**

By L. B. BOYER. *Calif. Med.*, **74**, 431, June 1951.

2382. **The Baldwin-Mori Operation for Congenital Absence of the Vagina. Technique and Results. Comparison of Various Plastic Procedures.** (A propos de l'opération de Baldwin-Mori pour absence congénitale de vagin. Technique. Résultats. Discussion, critique des divers procédés de plastic.)

By P. BROCQ and H. ROBERT. *Mém. Acad. Chir., Paris*, **77**, 141–149, Jan. 31, 1951.

2383. **The Baldwin Operation.** (L'opération de Baldwin.)

By –. BAUMGARTNER. *Mém. Acad. Chir., Paris*, **77**, 172–173, Feb. 7, 1951.

2384. **Creation of an Artificial Vagina by Epithelization over a Mould.** (La création d'un néo-vagin par simple épidermisation sur moule.)

By A. SICARD. *Mém. Acad. Chir., Paris*, **77**, 169–172, Feb. 7, 1951.

2385. **Twelve Cases of Absence of Vagina. Free Vaginal Grafts and their Fate.** (Douze observations d'absence de vagin. Greffes vaginales libres. Devenir de la greffe.)

By G. CORDIER and –. MALINAS. *Mém. Acad. Chir., Paris*, **77**, 149–157, Jan. 31, 1951. 2 figs.

2386. **Vesical Exstrophy and Construction of an Artificial Vagina.** (Exstrophie vésicale et néo-vagin.)

By A. PERROT, E. NAZ, and W. TAILLARD. *Mém. Acad. Chir., Paris*, **77**, 131–136, Jan. 31, 1951. 3 figs.

2387. **Suture Technique in Amputation of the Portio Vaginalis.** (Ueber die Nahttechnik bei der Portioamputation.)

By C. ASHÖLTER. *Zbl. Gynäk.*, **73**, 1055–1057, 1951. 2 figs., 6 refs.

2388. **Abdominal Myomectomy, Advantages and Disadvantages.**

By E. W. MUNNELL and F. W. MARTIN. *Amer. J. Obstet. Gynec.*, **62**, 109–120, July 1951. 3 figs., 14 refs.

2389. **Experiences in the Use of an Extended Method of Hypogastric Sympathectomy (Sympathicectomia Hypogastrica Subtotalis) in the Treatment of Primary Algomenorrhoea.**

By P. VARA. *Acta obstet. gynec. scand.*, Suppl. 5, **30**, 1–47, 1950. 3 figs., bibliography.

In the introduction to this paper the author gives his reasons for using the word algomenorrhoea instead of the more usual dysmenorrhoea. He uses the former to designate all painful conditions which are synchronous with the menstrual bleeding and of which menstruation is either the direct cause or merely a promoting factor; primary algomenorrhoea is regarded as "a painful condition almost exclusively of the vegetative nervous system and of purely genital origin". He employs the term dysmenorrhoea to convey the general concept of difficulty in the function of the menstrual mechanism.

The aetiological factors in primary algomenorrhoea are reviewed in relation to the anatomical and physiological background As Cotté's resection of the hypogastric plexus had not always given the desired result, the author extended the operation by removing the sympathetic trunk and the nerve ganglia L 5 and S 1 on both sides, between L 4 and S 2 ganglia.

Altogether 65 such operations were performed, mostly at the Second Women's Clinic of the University of Helsinki, in the period 1945 to 1948; 56 of these cases have been followed up, the results being: successful, 87 per cent; partial success, 7 per cent; relapse, 4 per cent; failure, 2 per cent (one case). The menstrual cycle, in duration and amount, appeared to become normal following operation. There were no disorders of micturition. Constipation occurred in 2 cases. Nine of the patients became pregnant and were delivered after operation. It was stated that both the first and second stages of labour were painless until distension of the perineum began.

The paper concludes with the claim that the results obtained from this operation indicate that in stubborn cases of primary algomenorrhoea this operation is an effective, fairly rapid, and relatively harmless procedure. *Donald Beaton*

2390. **Total Hysterectomy.**

By N. W. SWINTON and H. HENSCHEN. *Surg. Clin. N. Amer.*, **31**, 861–868, June 1951. 3 figs., 4 refs.

2391. **The Surgical Menopause Following Hysterectomy: A Study of 332 Cases.**

By N. A. RICHARDS. *Proc. R. Soc. Med.*, **44**, 496–498, June 1951.

2392. **Partial and Total Pelvic Evisceration for Widespread Carcinoma of the Cervix.** (Eviscerazione pelvica parziale e totale per carcinoma diffuso del collo.)

By A. BRUNSCHWIG. *Minerva ginec.*, **3**, 199–202, May 1951.

2393. **The Aetiology and Operative Treatment of Prolapse of the Vagina following Hysterectomy.** (Aetiologie und Operation des Scheidenstumpfprolapses.)

By J. AMREICH. *Wien. klin. Wschr.*, **63**, 74–77, Feb. 2, 1951. 2 figs., 13 refs.

2394. **Urinary Function after Radical Operation for Carcinoma of the Cervix.** (Das funktionelle verhalten des Harnapparates nach Radikaloperationen wegen Carcinoma colli uteri.)

By G. NARIK and E. KOJER. *Klin. Med., Wien*, **6**, 248–255, June 1951. 8 figs., 5 refs.

2395. **Transvaginal Operations for Carcinoma and Their Long-term Results.** (Operazioni per carcinoma per la via vaginale e loro risultati a distanza.)

By I. AMREICH. *Minerva ginec.*, **3**, 207–210, May 1951. 6 refs.

2396. **Experimental Study of the Mechanism of the Ovarian Reaction to Ligation of the Uterine Cornu in the Adult Rat.** (Etude expérimentale du mécanisme des réactions ovariennes après ligature de la corne utérine chez la rate adulte.)

By R. BOURG and J. SIMON. *Bull Acad. Méd. Belg.*, **16**, 156–185, 1951. 40 figs., 22 refs.

2397. **Interaponeurotic Suspension in Hysteropexy for Recurrent Uterine Prolapse.** (Exo-histeropexia interaponeurotica suspendida: prolapso uterino recidivado por tercera vez.)

By A. GARCIA LOZA. *Gaz. méd. portug.*, **4**, 331–209, 1951. 8 figs.

2398. **Manchester Operation of Colporrhaphy in the Treatment of Uterine Prolapse.**

By L. E. PHANEUF. *Amer. J. Surg.*, **82**, 156–162, July 1951. 4 figs., 5 refs.

2399. **Colpoperineorrhaphy with Continuous Submucous and Subcutaneous Suture.** (Colpoperineorrafía con sutura submucosa y subdérmica continua.)

By F. ZALDIVAR BERNAL. *Ginec. Obstet. Méx.*, **5**, 413–428, Nov.-Dec. 1950. 24 figs., 10 refs.

2400. **Surgical Treatment of Inoperable Prolapse.** (Tratamiento quirúrgico del prolapso genital inoperable.)

By D. GALLO. *Ginec. Obstet. Méx.*, **5**, 446–452, Nov.-Dec. 1950. 9 figs.

2401. **Application of Physiologic and Pathologic Principles to Surgery of the Ovary.**

By E. NOVAK. *J. Amer. med. Ass.*, **146**, 881–885, July 7, 1951.

2402. **Analytical Study of 44 Cases of Tubo-uterine Implantation.** (Etude analytique de 44 cas d'implantation tubo-utérine.)

By R. PALMER. *Mém. Acad. Chir., Paris*, **77**, 216–220, Feb. 21, 1951.

Raoul Palmer reports an analysis of 44 personal cases of tubo-uterine implantation for sterility. He insists that before operation is undertaken the fimbrial and ampullary segments of the tube must be healthy, this being determined either at operation or by coelioscopy. He considers that the results of pure implantation are better than those of salpingostomy or fimbriolysis. A dictum we all agree with.

Of his cases, 26 were pure stenosis of the isthmus and interstital portions of the tube. His results were 8 pregnancies, a 37.5 per cent success, and one ectopic. Three of the deliveries were by Caesarean section, one being for herniation of the cornual scar; 5 were naturally delivered. Eighteen other cases were implantations together with, or including, salpingolysis or salpingostomy. Of these 2 became pregnant, that is 11 per cent success, and 1 had an ectopic.

All the pregnancies occurred between the 5th and 18th month after implantation.

His analysis indicates that all the implantations were ampullary-uterine; in one case the conserved ampulla was only 4 cm. in length.

His latest series of pure implantations has given a pregnancy success rate of 41 per cent, which is indeed a remarkable and inspiring achievement.

Palmer has tried many methods and has rejected all except that of coning out a cylinder of tissue, the diameter of a pencil, at one or both cornua in the line of the stenosed interstitial portion of the tube. The proximal ampullary end which is to be implanted is cut down on each side for half an inch and each flap is pinioned with a thread of nylon oooo size. Using a straight Reverdin needle, which is inserted through the wall of the uterus into the endometrial cavity above and below the internal ostium of the tunnel, the nylon threads are drawn through the cornual tunnel and secured to the wall in the same way as one transplants ureters into the bowel. Great care is taken to secure haemostasis and avoid strangulation of the tube as it passes through the uterine wall at the cornua.

Formerly Palmer threaded the tubes with ureteric catheters and at times catgut, nylon, etc., which were passed down into the vagina, but all these methods have been discarded.

Insufflation is performed 6 weeks after operation, either with or without antispasmodics, for he has shown that spasmodic obturation occurs in nearly 20 per cent of his cases.

Palmer does not implant if the fimbrial ends are firmly blocked, or there are peritubal and periovarian adhesions. He lays stress on the surgeon having the correct instruments, and considers that the husband should be adequately tested and examined before operation is undertaken in the married couple.

It is, of course, an accepted fact that the interstitial and isthmial blocked tubes with healthy ampullae and fimbriae are almost invariably subsequent to septic or induced miscarriages. Therefore, with such a history in the married or unmarried, ampullary-uterine implantation after full investigation is well worth doing these days.

V. B. Green-Armytage

2403. **The Prophylaxis of Post-operative Retention of Urine.** (Sulla profilassi della ritenzione urinaria post-operatoria.)

By P. TOSCHI. *Minerva ginec.*, **3**, 166–168, Apr. 1951. 3 refs.

MISCELLANEOUS

2404. **The Syndrome of Large, Pale Ovaries and its Differentiation from Adrenogenital Syndrome and Cushing's Disease.**
By R. B. GREENBLATT. *Postgrad. Med.*, **9**, 492–500, June 1951. 17 figs., 26 refs.

2405. **Genital Prolapse and Incontinence of Urine.** (Genitalprolaps och urininkontinens.)
By G. STRÖDE. *Nord. Med.*, **45**, 194–197, Feb. 7, 1951. 1 fig., 6 refs.

2406. **Inversion of the Uterus.** (Prolapsus uteri inversi.)
By J. A. ABOLINS. *Nord. Med.*, **45**, 197–198, Feb. 7, 1951. 48 refs.

2407. **Inversion of the Uterus. Report of a Case.**
By H. F. HARBITZ. *J. Oslo Cy Hosp.*, **1**, 148–151, June 1951. 1 fig., 3 refs.

2408. **Perforation of a Non-pregnant Uterus.**
By L. A. CALDWELL. *Canad. med. Ass. J.*, **64**, 533–534, June 1951. 3 figs., 8 refs.

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